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# MINING AND SCIENTIFIC PRESS.

INV. 1894

68471

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, JANUARY 7, 1888.

VOLUME LVI.  
Number 1.

## The Drumlunnon Mine.

We gave in a recent number of the PRESS a description of the famous Drumlunnon mine, belonging to "The Montana Co., Limited," and also an engraving showing a vertical section of the mine. It seems that in London, recently, efforts have been made to spread reports of a damaging character to the mine and its managers. Some of the shareholders became unduly alarmed at these reports and the unexpected change in grade of ore. The resident director in answer to inquiries made by cable regarding the reserves of high-grade ore at present blocked out and in sight ready for extraction, says "that the amount may be estimated approximately at 72,000 tons, but that \$35-ore is the highest grade in reserve at present." The point of division between high and low grade ore is \$20 per ton; all over \$20 in value is included in the estimates of reserves as high-grade ore. Of low-grade ore there is a very much larger quantity now than when the last half-yearly estimate was made.

The "unexpected change" is explained thus: The body of very high-grade ore running from \$50 to \$70 per ton which existed at and for some distance above the 400-foot level in Pixley Nos. 2 and 3 shoots, was found to have been disturbed, as stated by Mr. R. T. Bayliss at the meeting on 24th September last, at the 500-foot level, by the crossing of the Armistage lode, and for the present and until discoveries of very high-grade ore are made they must rely upon ore of about half its value to supply the 50 and 10-stamp-mills. It was quite unexpected that the very rich ore would have lasted until the Jubilee and other rich shoots might be cut in the 600-foot level and elsewhere. These expectations have not yet been fulfilled, hence the falling off meanwhile in the monthly runs.

Mr. R. T. Bayliss has communicated by cablegram the following estimates for the guidance of the directors and shareholders regarding the monthly runs expected. He estimates the run for December at about \$110,000, and the average runs for January, February, and March, 1888, at about \$120,000 or \$130,000 per month, and it is expected that there will be a reduction in working expenses, an indication of which is given in the November statement, in which they are shown to be \$49,000, as against \$56,000 for October. Should the Jubilee or other shoots of very high-grade ore be cut in the meantime, the returns will, no doubt, be favorably affected. Shareholders will remember that in November, 1884, the mine and its capital of £660,000 was on the verge of being lost to them. Since that date the mine has paid off the then existing mortgage and debts, and in the last two years has returned to its stockholders in dividends more than half the capital of the company, besides paying for the

acquisition of several adjoining properties of great value; and further, has paid very large sums out of revenue for machinery, depreciation and reserve funds. These statements are made by the directors to the shareholders to protect them against undue and unreasoning panic.

THE "coal famine" in California is helping out the Oregon coal-mining regions. Near Marshfield heretofore they have been working only the Newport mine, but now they are going to start up the Eastport and Southport mines. The Newport is producing from 6000 to 8000 tons per month, and owing to the coal famine there has been an increase in miners'

## An Automatic Fuel Feeder.

We give on this page a cut of Garland's automatic sawdust or fuel feeder for boiler furnaces, applied to a three-boiler furnace. In the engraving *E* is the feed-trunk, which is made of No. 12 or 14 tank iron and is provided with running strips of iron in the bottom of the trunk; also with ribs near the top of the buckets to return on. The dust or fuel is fed to the trunk *E* over the shaft and sprocket wheel at *H* 2 and is carried forward by the chain and buckets and fed to the spouts *F* to the grate-bars. The spouts *F* are made of cast iron, and the standard size is 20 inches lengthwise of the boilers and 8 inches

## That Reward to Inventors.

In a recent number of the PRESS we made mention of the fact [that the Government of New South Wales had offered a reward of £25,000 to any person or persons who will make known and demonstrate at his or their own expense any method or process not previously known in the Colony for the effectual extermination of rabbits.

The reward is offered through "The Department of Mines." The conditions are as follows:

1st. That such method or process shall, after an experiment for a period of 12 months, receive the approval of a board appointed for that purpose by the Government, with the advice of the Executive Council.

2d. That such method or process should, in the opinion of the board, not be injurious, and shall not involve the use of any matter, animal or thing which may be noxious to horses, cattle, sheep, camels, goats, swine or dogs.

3d. That the board shall be bound not to disclose the particulars of any method or process unless such board shall decide to give such method or process a trial.

All communications relating to the above must be addressed to the Honorable F. Abigail, Secretary for Mines, Sydney, New South Wales.

Of course, all sorts of things have already been tried to prevent the spread of the rabbits and exterminate those already in existence. Poisons of various kinds have been used.

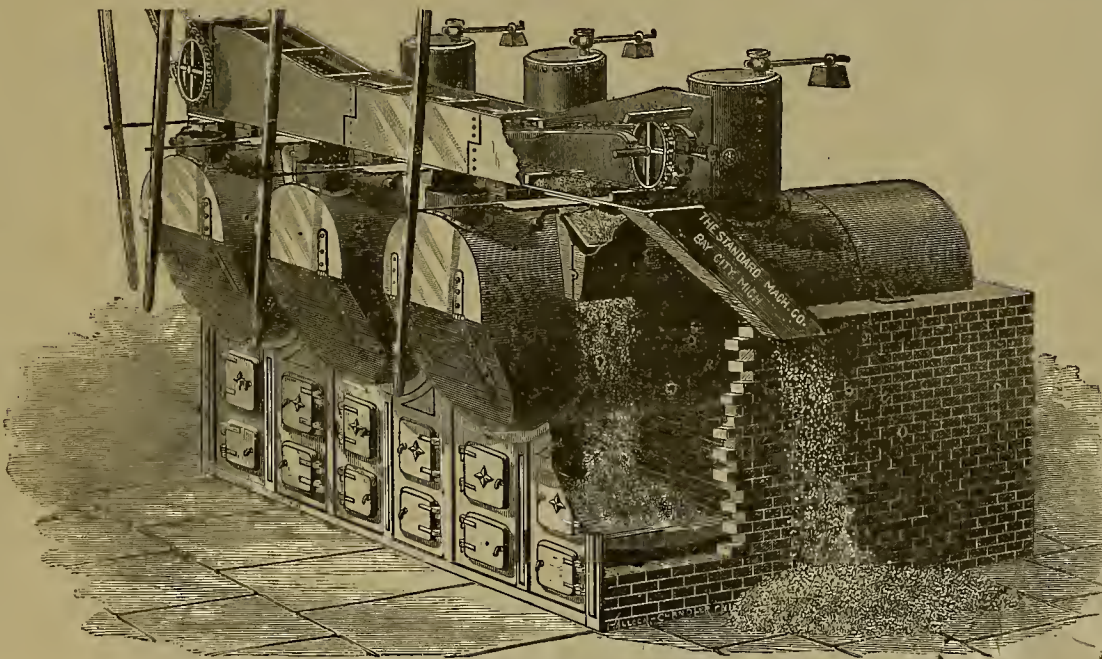
The Inspector of Stock of Victoria thinks the main cause of the failure of the

poisons in that Colony has been the want of simultaneous action on the part of the owners whose land was infested. Phosphorus is now more generally used than any other process. The inventors of the United States have a chance to earn a big reward if they can by any means solve the problem set before them.

THE extent to which the Atchison & Santa Fe railroad will build in Southern California may be inferred from the fact that already 3500 tons of steel rails are in San Diego harbor and 6500 tons more are on the way, every foot of which will be used in track-laying in Southern California. The Southern Pacific, too, does not intend to neglect the lower portion of the State, but will considerably amplify its mileage there.

QUICKSILVER continues firmly held at \$48 to \$50 per flask. The production in California last year is given at 31,000 flasks, and the exports at 19,573 flasks, against a production of 29,981 flasks and exports of 19,950 flasks in 1886.

THE El Callao gold mine in Venezuela is producing about \$100,000 per month. For the first five months of 1887 the product was \$621,500, or \$104,300 per month. Total product in 15 years, \$21,841,000.



THE GARLAND AUTOMATIC FUEL FEEDER FOR BOILER FURNACES.

wages of from 50 to 75 cents a day, or \$1.12½ per ton. The famine has increased the output from 2000 to 3000 tons per month. Coos county, in which Marshfield is situated, has a population of about 7000, and does all its trading with San Francisco, as does all the region west of the Coast Range.

MR. M. PRACHT of Alaska says of the mines there: "The chain of islands, including Douglas island, 200 miles distant from Naha bay, are nothing else but the tops of a submerged mountain range. The mountain-tops, too, are quarries of low-grade gold ore, averaging, like the now famous Treadwell mine of Douglas island, from \$5 to \$6 a ton. It is a great field for heavy capitalists, but not a good one for men with no money. The Treadwell people had to invest \$500,000 before they got on a basis to make money. Their 120-stamp mill enabled them to make a profit. They are now realizing over \$100,000 a month right along."

DURING the past year the price of quicksilver reached a higher point than for many years, the local market going as high as \$50 (nominally) per flask. During the past 10 years the lowest price in this market was \$25.25 per flask, in 1879.

wide. This is at the top end, and at the bottom the size is 20 inches by 3½ inches. About 18 inches from the trunk *E* to where the dust is discharged from the spouts, there is a cast rib on the front and rear side 6 inches from the trunk down; the rib rests on two bars of iron. The bars run across the boilers and support the trunk and spouts, and all machinery attached to the trunk. The spouts *F* are provided with slide-doors *G* and balance-doors *D*, with weights and set-screws. They can be readily adjusted. The balance-doors are used as a protection should the fireman get careless and leave the slide open and at the same time open the front furnace-doors. Again, they keep the rush of air down them to a small quantity which does not impair the draft of the furnaces. The trunk *E* is 20 inches wide and is placed directly over the center of the grate-bars so the discharge of the dust will be on the center of the grates. If the operator is a good one the overflow spout *F* 2 can be dispensed with where it will be objectionable and the feed to the trunk can be regulated just sufficient to feed the fire properly. This can be done in the carrier that conveys the fuel to the feed-trunk. The feeder and frames are all of iron, so that they are safe and fire-proof. The Pacific Coast agents are H. P. Gregory & Co. of this city.



## CORRESPONDENCE.

We admit, unindorsed, opinions of correspondents.—Eds.

## Bernice District, Nev.

EDITORS PRESS:—Mention not having been made of this district in your paper for some little time, I will endeavor to give an account of what we have been doing, and show that we have not been "sleeping on our oars." Without attempting to minutely describe the progressive stages of development in each individual claim (in this letter at least), I will confine myself to mines where work of development places them in a position to begin the work of extracting ore on a long and productive stretch. The Golden Crown, whose record in the past few years has been a very satisfactory one to its owner, Mr. W. W. Williams, has accomplished an amount of deadwork within the past six or eight months that required both pluck and money to accomplish, considering the ruinous depression in silver and the long stretch of tunneling and upraising to make in order to give facility for stoping and free ventilation. The two upper levels being partly worked out, it became necessary to run a still lower tunnel, which was commenced over a year ago, at 200 feet lower on the pitch of the ledge. The main chute of ore in the mine pitching to the northwest required a tunnel entering on the south side of the hill 850 feet to reach the ore with an uprise of 195 feet to connect with the level above, opening a large area of ground for stoping, which gives every promise of yielding a handsome return.

The two levels above turned out about a quarter of a million in bullion. There is every reason to believe the present level will double that amount, the character of the ore being greatly improved as depth is attained. With an abundant supply of wood and salt and the mill all ready for action, signs of life and activity will soon make themselves manifest.

The Silver Ridge mine is owned by M. W. Hoyt. A force of able-bodied miners has been working like beavers for several months at deadwork in the opening of a new level, which is expected will be ready for the extraction of ore by the beginning of the new year. The ore from this mine is of good grade, milling about \$150 per ton.

South from here, on this same range of mountains, Stone & Oats, with the assistance of "Poker Boh" as chief engineer on the wind-las, are opening a very promising piece of property. They were down last week 93 feet on a vein of carbonate and galena ore averaging two and a half to three feet the entire distance. The footwall is quartzite and the hanging a gray lime. They estimate to have 100 tons of first-class smelting ore on the dump. J. I. Bernice, Churchill Co., Nev., Dec. 26th.

## Nevada Copper.

At one time a considerable amount of copper was produced in this State, says the Virginia Enterprise, but owing to the low price of the metal which ruled for some years those engaged in copper-smelting turned their attention to gold and silver mining.

In 1882 the copper yield of Nevada was 350,000 pounds; in 1883 it was 288,077; in 1884, 100,000; in 1885, when copper-smelting was abandoned, it was but 8871 pounds.

Now, however, there seems likely to be a boom in copper, and we shall probably again become a copper-producing State. Owing to the shutting down of the great Calumet and Hecla mine, on account of the fire in its lower levels, copper is likely to be in very brisk demand. Already an Eastern metal firm has announced its readiness to take all the copper produced in the United States, and to keep on taking it until the price reaches \$80 a ton.

We have in the Walker Lake region some very rich copper mines. Some of these have been worked, are already opened in good shape, and have furnaces which are still probably in a condition to be fired up with slight repairs. There are good veins of copper in all parts of the State, but only a few of them have ever been opened or worked. In places hundreds of tons of ore lie on the sides of mountains where it has tumbled down from the croppings of veins above, and in not a few veins native copper is to be seen at the surface of the ground and sometimes 10 feet above the surface.

THE CARSON HILL MINE.—A decision was rendered last week by the Supreme Court in a very old mining suit. A. Gray Morgan was owner and in possession of a gold mine at Carson Hill, Calaveras county. He died in this city on the 26th of April, 1860, and on the 18th of December, 1861, R. F. Sinton, who was the administrator of the estate, sold to James G. Fair all of Morgan's interest in the mining company which the latter, prior to his death, promoted to work the mine. At the time there were other persons in possession of the property adverse to the interests of Fair. Legal proceedings in connection with the Carson Hill mine were before the courts from 1865 to 1867, when James G. Fair was declared the owner of Morgan's rights. On the 25th of October, 1879, the property was assessed for \$84, which sum was not paid, and the property being about to be sold, William Irvine received from Fair the money wherewith to purchase it. In 1870 he went into possession, it is alleged, as the agent of Fair, and so remained until the 1st of October, 1872, when he asserted that he was the owner of the mine and disavowed his having been agent for Fair. On the 4th of July, 1876, Cornelius O'Connor was deeded all of Fair's claims to the property and began proceedings for its recovery, with the result that in the old District Court judgment was pronounced in his favor. An appeal was taken in the case. J. Selevor, who was interested with Fair in the original transaction regarding the mine, was not made a party to the proceedings in the court below, and last week the Supreme Court decided that the absence of Selevor as a party prevented a complete determination of the suit and declared the former order and judgment reversed and directed a new trial.

## California Products.

The following is copied from a pamphlet issued by Colusa county during the present year:

The population of the State of California is more than 1,000,000, and is being increased by births and immigration at the rate of 60,000 per annum.

The State of California is practically out of debt. The banking capital of the State is \$50,000,000, held by about 100 banking institutions. The resources of the banks foot up \$170,000,000. The banks hold cash on hand \$25,000,000, and reserve funds of \$15,000,000. They hold on deposit over \$100,000,000, of which over \$60,000,000 is held by the savings banks. The annual increase of deposits is about \$10,000,000. The average amount of deposits per capita is \$715, the highest average in the United States. The annual product of hulla is \$18,000,000. The average value of the wheat crop is \$40,000,000; barley crop, \$10,000,000; dairy products, \$10,000,000; bay crop, \$13,000,000; wool clip, \$9,000,000; fruit crop, \$12,000,000; wine products, \$7,000,000; manufactured lumber, \$6,000,000; animals, poultry, etc., slaughtered, \$23,000,000; manufactures, \$50,000,000; other products, \$10,000,000; total value of annual products, \$190,000,000. There are over 100,000,000 vines and over 8,000,000 fruit trees in cultivation in the State.

The State contains 3500 miles of railroad, 5000 miles of telegraph line, 5000 miles of mining ditches, with an equal extent of irrigating ditches, 400 quartz-mills, 300 sawmills and 200 flouring-mills.

The assessed value of the real estate of the State is \$616,000,000; personal property, \$152,000,000; railroads, \$48,000,000, or a total assessed valuation of all property in the State of \$816,000,000, representing a real valuation of not less than \$1,200,000,000. California ranks ninth in the Union in aggregate wealth and first in per capita wealth.

COAL SUPPLY OF THE RAILROAD COMPANY.—The Southern Pacific Railroad Company is not experiencing any trouble with regard to the scarcity of coal. One of the officials of the road stated to a Chronicle reporter recently that the product of the company's Carson Hill mine is now about 20,000 tons a month. The steam collier San Pedro is undergoing repairs at the Union Iron Works, and as soon as they are completed she will resume her trips to the mine. The mines of the Rocky Mountain Coal Company are furnishing fuel at the rate of 1000 tons a day. From the Union Pacific Railroad Company's mines at Green River and from the Atchison, Topeka & Santa Fe Railroad Company's mines at Trinidad, the Southern Pacific Company is also obtaining supplies for its locomotives. It is a strange fact that although the Southern Pacific and Central Pacific systems extend from Louisiana to Oregon, there has never been found a trace of coal at any portion of their property, although they have expended thousands of dollars searching for the mineral. The foreign coal required at the Sacramento works of the company has been contracted for some time ago, and large stocks of that particular kind of fuel are now on hand.

A NEW MINERAL.—A few weeks since Mr. John Farish, the well known mining engineer and mineralogist of Denver, visited Tombstone, and while here procured a sample of ore from the Bob Ingersoll mine. Upon examining the rock he found it to contain, among other metals, one which to him was entirely unknown. After a patient search and thorough delving among all the authorities on mineralogy, he found himself still unable to determine the character of the mineral and submitted it to Prof. Emmons of Denver, one of the best authorities in the United States on mineralogy, for analysis. The professor gave the matter careful study, and he, too, could not determine what it was, and forwarded it to the Smithsonian Institute. Here was the court of last resort, and here it was determined that the mineral was one hitherto unknown. The authorities of the Institute, in honor of Prof. Emmons, whom they supposed had discovered it, gave it the name of Emmonsite, although, as will be seen from the foregoing, the honor more properly belongs to Mr. Farish. The mineral is found in the form of a green crystal, but as yet its commercial value has not been determined.—Tombstone Prospector.

A PARTY of fishermen from Gloucester, Mass., has arrived at Puget Sound. Three fishing schooners are on the way.

## Mechanical Engineers.

(Concluded from our last.)

[From our Special Correspondent.]

The first paper read before the evening session was by John J. Grant, and his subject was "The Milling Machines as the Substitutes for the Planer in Machine Construction." The speaker thought that every part of a locomotive could be as well made by the milling machine as by the planer, and from one-half to one-tenth the cost.

A discussion followed in which Henry R. Towne, Prof. Webb, Charles Potter, Jr., Prof. Denton, John E. Sweet, W. F. Durfee and John T. Hawkins took part.

Prof. E. H. Thurston of Ithaca, N. Y., presented a paper by Frank Van Vleet on "Standard Section Lining." This paper advocated a uniform system or method to be used in sectional drawings, just as uniformity is now generally in heraldic and geologic draughtsmen's work.

Percy A. Sanguinetti of Philadelphia read an essay entitled "Divergencies in Flange Diameters of Pumps, Valves, etc., of Different Makers." The question of their divergence elicited remarks from W. O. Webber, Fred W. Taylor, Mr. Towne, W. Barnes Le Van, Mr. Weightman, Louis G. Engel, A. H. Raynal, Mr. Kent, Wm. F. Mettes, Mr. Hawkins and E. F. C. Davis.

A thesis on "Centrifugal Pumps and their Efficiencies," by Wm. O. Webber, was read by the secretary, Prof. Thurston and Prof. De Volson Wood of Hoboken, N. J., gave their views on the subject.

The society was invited to visit the Franklin Institute, Riehle Bros' warerooms, H. Daston & Sons' factory, and by Mr. J. J. DeKinder to the city water works.

The morning and afternoon sessions of the third day were devoted to the reading and discussion of papers on technical subjects. The first, entitled "Friction in Toothed Gearing," presented by Prof. Gaetano Lanza, of the Institute of Technology, Boston, Mass., was purely theoretical, and presented as conclusions that the relative efficiency of the bicyclic and the involute form of tooth depends upon the proportions used for each, and that the efficiency of involute gears is not, as has been claimed, independent of the obliquity. The paper was discussed by Professors Webb, Denton, Wilfred Lewis and Hugo Bilgram of this city.

A paper describing "an investigation as to how to test the strength of cements," and giving tables of the results of tests on Portland and Rosendale cements by means of compression, tension, and the use of an eccentric load, was also presented by Prof. Lanza, who stated that it had been written by Prof. Jerome Sondericker of the Institute of Technology. Profs. Lanza and Denton, and Henry De B. Parsons of New York, discussed the paper. Mr. Parsons contributed the next paper, which was entitled "Influence of Sugar on Cement," and contained the result of a number of experiments made by the author, assisted by Henry Hobart Porter, Jr., E. M. The machine used was a "Riehle Bros. Standard Cement Tester," and there were three series of tests. In the first, one per cent refuse molasses being used with Portland cement; in the second, one eighth to two per cent pure crystallized sugar, dissolved, with the same kind of cement; and in the third series Rosendale cement, with two per cent of sugar, as in the second series. It was concluded that the molasses and sugar, by retaining the setting of the cement, ultimately makes it firmer. Prof. Denton, Mr. Parsons and Louis G. Engel, of the Brooklyn Sugar Refining Co., Brooklyn, N. Y., took part in the discussion on the paper.

A paper on "Steel Car Axles" was contributed by John Coffin, of the Cambria Iron Works, Johnstown, Pa. It summarized the results of a number of experiments, with the observations that the chemical energy of the charge of carbon is commensurate with the amount of carbon present in the steel; that the work to be done in breaking up the crystals is commensurate with their size; while the carbon is changing to its non-hardening state, a force is exerted tending to break up crystallization, and that at a white heat steel becomes nearly amorphous. A description was given.

## The Copper Queen Mine.

Twenty tons of clean copper a day is what is coming out of the Copper Queen mine at Bisbee, Arizona, now, said J. E. Durkee at the Palace hotel. Mr. Durkee had just written his name on the register, having yet Arizona dust on his clothes. He is of the firm of J. E. Durkee & Co., the heaviest freighters of Arizona, owning over 100 powerful draft mules and 150 wagons.

"I haul the copper bullion out and the coke in," said Mr. Durkee. "What do you think of 20 tons of pure copper a day? Make a good many kettles, eh? Nobody down there now says he wouldn't give a copper for this or that, because copper has gone up to booming figures. In six weeks it has climbed from 10 to 18 cents a pound. Money is plenty. Bisbee is the liveliest camp in Arizona now. I reckon there are not less than 2500 people there, and every one as busy as a bee. Between 300 and 400 men are at work in and about the mine. They just quarry the copper out, it is so pure. The

vein is very big. The owners of the Queen have a smelter, and they make the ore into bullion without any ado.

"The copper from this mine is first-class, and brings top-notch figures. The Calumet and Hecla fire and the French syndicate, in their endeavors to corner the market, have done the business for the owners of the Queen and the people of Bisbee. Nothing could have suited them better.

"Bisbee is 30 miles from Fairbanks, which is on the Sonora division of the Santa Fe railroad from Benson."

## He Was Not a '49er.

"Then you are an old California miner," I said to a man that was talking very loud as we sat in the office of a Deadwood hotel.

"Yes, sir; yes, sir; one of the Argonauts, sir. Always lived in California till I came to look after my interest in the Homestake mine, sir."

"Were you one of the '49ers?"

"No, sir, I wasn't. I didn't reach California till 1850."

"Ah! I should think that was near enough so you could stretch it a little and say you got there in '49."

"I could if I wanted to make a liar of myself, but I don't, sir! I'm a man of my word, sir, and even if I was going to lie I wouldn't lie about a little thing like that!"

I was somewhat crestfallen, and after he had stepped out I suggested to the proprietor of the hotel that the Californian was the first man from the State of his age that I ever met who did not claim that he reached there in '49.

"When did he tell you that he went?" asked the proprietor.

"In 1850. He said he wouldn't lie about it for worlds—it does me good to see a Californian at last who can tell the truth on that point."

"Yes, well, you haven't seen one yet. To my certain knowledge the first time that old fellow struck California was in '67, when he came down from Vancouver island, where he went three or four years before to avoid the draft."—Chicago Tribune.

EQUADOR MINING REGIONS.—William King of Baltimore, during the past 16 months, has been prospecting for gold along the coast between Guayaquil and Buenaventura. Mr. King states that he prospected everywhere where he thought the ground appeared to be gold-bearing, but encountered nothing which promised to pay until he reached a place called Janabaja, at about a day and a half's canoe journey up a good waterway running in from Buenaventura, and situated in what is known as the Chiquitivi district. At Janabaja he saw extensive traces of old Spanish workings, where the whole region appears to have been sluiced—although it is somewhat difficult today to determine what system was followed, as gigantic trees have overgrown a district in which there are evidences that many thousands of men must at one time have been engaged. The people who now reside there continue to work in the river-beds. They use the batea—the wooden bowl, instead of the old and well-known iron wash pan—and thus obtain regularly from \$1 to \$2 per day, although they do not work regularly, but now and then, as the whim seizes them. Mr. King states that he believes the reason this district has never been thoroughly worked is that the majority of people who have gone there have not been miners. They have heard that gold is found there, and, without being miners, have expected to turn up gold with the first blow of the pick. Mr. King claims there is gold there, and in good paying quantities, but there, as everywhere else, it has to be worked for if it is to be obtained.

THE COAST SURVEY.—Captain Rodgers of the United States Coast and Geodetic Survey has returned from his season's work in the lower part of California, where he has been engaged in the prosecution of the topography and the tertiary triangulation. He commenced the season with a survey of the shore line of San Diego bay and the location of the wharves and other improvements, preparatory to a study of the physical hydrography of that vicinity. After that he pushed forward the triangulation and the topography to the northward. In order to utilize the coast determinations for the new chart from San Francisco to San Diego, he has run in the shore line ahead of the other topography, and made a connection with his previous seasons' work from the northward. Captain Forney has also returned from his season's work in the region from Pismo Blancas toward "The Sur," just south of Carmel bay. This is perhaps the wildest stretch of coast line on the Pacific seaboard. The Twin Peaks reach an elevation of 5100 feet within three and a half miles of the water, and in one place the height of the rocky face is 3200 feet only half a mile from the ocean. This precipitous seawall is cut in many places by deep and almost inaccessible gulches, which it is necessary to go around, because they cannot be crossed. The work has progressed very favorably, notwithstanding the smoke and fog have been very dense this season. Mr. Winston of Captain Rodgers' party has also returned, and, with Messrs. Rodgers and Forney, is engaged in reducing the season's work.

CAPITAL has been subscribed to build a lumber mill at Woodland, Yolo Co. The land has been donated.



## The Mines and Miners.

BY PEDRO CASTERA.

(Continued from issue of Dec. 17th.)

Translated for the PRESS from *El Minero Mexicano* by M. N. M.

## The Blaster.

Santa Rosa is one of the five shafts of the Valenciana mine, situated in one of the principal mineral regions of the world—Guajalato. It is likewise the first and richest in our State, and should be regarded with pride by her sons as having a greater depth than any other mine in the world. Before proceeding, and in order that one may not believe that I am drawing upon my imagination, I will mention that in the year 1851 in the Arcangelos shaft, belonging to the mine of the same name, situated in the Real de la Luz, a number of sacks of powder exploded which instantly killed 140 men. In the shaft of Los Ingleses, also belonging to the same Real (mining town), the roof of the works of the Purisima and San Antonio fell in, burying the greater part of the people of the mine. If I were to continue citing historical facts concerning Guajalato only, I could fill volumes. That to which I now refer happened to Senor D. Luciano Cerbera in the shaft of Santa Rosa. To open a shaft is to penetrate from the surface to the heart of a hill, passing through strata of slate, porphyry, marble, granite, quartz and other kinds of stone, hard, resisting and difficult to break. This is effected by making a pozo (hole) square or polygonal, which varies in form and dimensions.

## The Surface Having Been Outlined

Or traced, they penetrate by means of taledros (borers) operated by two men, one using a barreta (small bar) of steel, the point of which rests against the rock, and the other striking with a hammer against the head of the barrena (borer) which is seen above the barretero and near his ear. When the borer measures half a vara or a vara the barreno (hole) is loaded with powder, a canyuela or mecha (matchrope or fuse) is applied, it is then filled with earth, which is packed down, after which fire is applied to the mecha. This is what is called making, loading and firing a barreno. Upon setting fire to the powder by the canyuela there is an explosion and the rocks are rent as if by a grenade. In this manner the work is carried on, penetrating to the interior by a succession of borings. I omitted to explain that when the hammer misses the barrena, either intentionally or involuntarily, sometimes the barretero's hands are crushed, and at other times his head is broken, the brains spattering the walls or pavements of the works. When a tiro or shaft reaches 20, 30 or more varas of depth, 12 to 15 barrenos are opened in the bottom, charged with powder and made ready for firing with mechas of different sizes. All then go out of the tiro, and a man whose salary is large because of the danger attending his work, descends to fire the barrenos. This man is the pegador. The writer, when but a youth, acted as pegador at the time they were opening the tiro of Providencia in San Anton de las Minas. The pegador has fastened in his belt a mecapal, with a hook, and when the mechas have been lighted he with his hook catches himself as quick as possible to a ring at the end of a cable which is suspended from the mouth of the tiro.

## This Cable or Rope is Wound Upon

The malacate (windlass) operated by horses, which rotate it rapidly as soon as they perceive the slightest movement or when they hear the voice of the cajonero who cries *arrea!* There are times when by the explosion of the barrenos, the man who is being hoisted up is killed. The tiro of Santa Rosa then measured 100 varas and Senor D. Luciano Cerbera was pegador. One evening he descended as usual to the bottom of the tiro and in the shaft which was some six varas in width, 18 barrenos with their canyuelas were ready to be exploded. With his *tea* or *hacha minera* in his hand he examined the condition of his mecapal, of the cable, of the ring and of the hook. Convinced that everything was in order, he called out to the man at the mouth of the tiro: "En el fondo y sin novedad!" (at the bottom and without injury). Then the cajonero, in order to notify him that all was ready, replied, "El pegador puede der fuego!" (the pegador can fire). Without fear—for miners think not of that—he rapidly lighted one after the other of the canyuelas and darted to the cable to hook himself to it, but could not do so, because in his effort to adjust the hook to the ring, the cable moved and the cajonero cried, "*arrea!*" The horses with their utmost speed revolved the windlass and the rope was wound up, leaving the pegador in the tiro. He saw that he was lost, but, being a resolute man, without hesitating an instant, he rushed to the barrenos

to draw out their canyuelas. He succeeded in removing eight, when suddenly a deafening and frightful noise resounded at the bottom of the tiro. The pegador, who had been thrown down by the concussion, rose up, and, supported by one of the walls of the tiro, courageously surveyed the danger which surrounded him.

## Nine Blasts were About to Thunder.

As the miners say, and the man would surely be torn to pieces by them; but he, impassible and undaunted, waited like a stoic. What was it that made Cambronne a hero? A word uttered at Waterloo, when the star of Napoleon was disappearing forever. Why has the phrase of Galileo, *E pur si muove*, become immortal? Because those expressions were the manifestations of an unconquerable spirit. The imbeciles and cowards, the envious, who choke themselves with their own drivel, the puppets of society, who dream that they are men because they can skillfully arrange their neckties,

## Oil at Stockton.

During the past few weeks rumors have been rife about the progress of the Standard Gas, Light and Fuel Company's oil well, which is situated just beyond the southwest boundaries of the city, a short distance from the Old French Camp tollhouse. At one time it was noised abroad that an immense flow of oil and gas had been tapped; again, the assertion was made that the well was a failure—that there was not the slightest indication of the presence of gas or oil, and that the company intended to abandon the well and give up the search as a bad job. No one was allowed on the premises while the machinery was in operation, and the most curious could do was to form their own conclusions from what little was to be seen about the well and heard upon the streets. It was generally known that R. C. McPherson, one of the most noted oil experts on the coast, had

tions obtainable that the oil belt has been struck, and that oil and gas abound in large quantities.

"Water is the natural enemy of oil. A heavy flow of water has been known to ruin a well with a capacity of 400 barrels per day. The efforts of the workmen are now devoted to attempts to shut off the water.

"This well," explained Mr. Beane, "is what we call an experimental hole, and in this instance the experiment has been more than satisfactory. We have demonstrated beyond the possibility of a doubt that oil belts traverse this valley, and we are satisfied that we have struck an abundance of oil. The only thing we have to contend against now is the water, which prevents the flow of oil. We are still endeavoring to shut off the water, and if we succeed in exhausting the flow we expect to secure a good flow of oil. The earth in this section is of a soft formation, and it will be necessary for us to secure machinery and tools that are adapted to the soil. We have purchased a new patent boring apparatus, with tools and machinery suitable for this country, by which the water can be shut off at each flow."

The company has located a second well on the levee at a point 1300 feet south of southwest of the experimental well, which has already been piped to a depth of 1185 feet. Work on the well, which has been suspended for some time, will be resumed in the course of a week, as soon as the new machinery and tools arrive. Mr. Beane does not anticipate any trouble about fighting against the water in the new well. He expects to have it in good working order within 65 days from the time work begins.

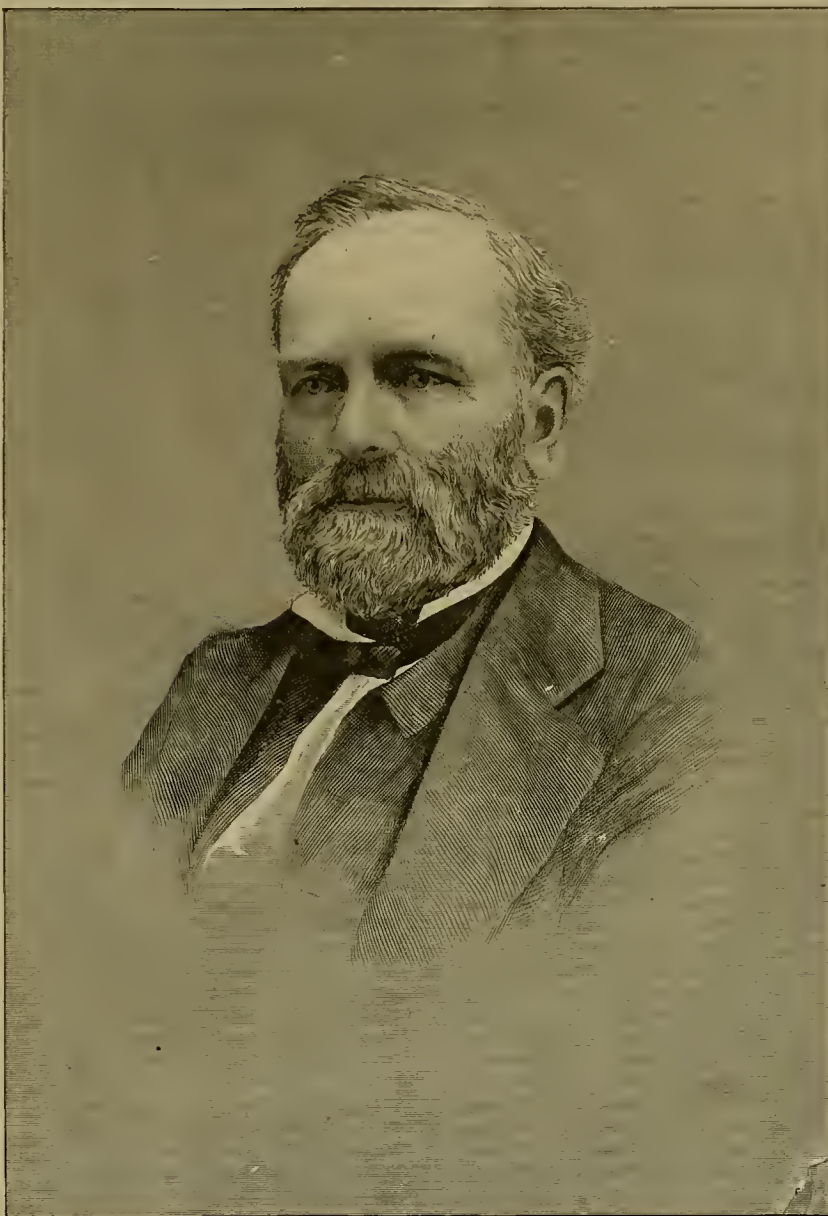
Mr. Beane stated that his company had selected 30 or 40 locations in different parts of the State and proposed to sink more wells. All through the San Joaquin valley and the Coast Range there are surface indications of oil, and, in Mr. Beane's opinion, it will only be a matter of time when Stockton, Tulare, Fresno, Modesto and other towns in this section of the State will be supplied with natural gas and oil in sufficient quantities to furnish all the light and heat required.—*Stockton Independent*.

## Charles Goodall.

The subject of this sketch was born in Somersetshire, England, on the 20th day of December, 1824. He received only an elementary education, which was deemed quite sufficient for a farmer's boy in those days. After a few initiatory years of farm labor, young Goodall's ambition was fired by the good news from the New World, and at the age of 16 he sailed from Liverpool to New York. Losing no time on his arrival hugging around the city seeking uncertain employment, he sailed to Albany, thence to Syracuse, and then traveled on foot into the country in search of occupation. After spending the winter with an English farmer he went to live with an old sea captain, who excited the young man by his big yarns to try a seafaring life, and not long after he sailed on a three years' whaling voyage in the ship *Milo*. This was the most eventful period in his life. During the voyage, which was quite successful, he visited the Cape Verde, Western, Sandwich and Society islands; Chili, Peru, Bolivia, Alaska, Juan Fernandez and many other places, and when the ship returned home richly laden his share was \$183. Little daunted, he again went to sea, and by enlarged travel, with observation and careful use of the ship's library, he laid the foundation of that intelligence, habits of thought, industry and perseverance which have made him one of the honored, successful and solid citizens of San Francisco.

He came to California in 1850, and with pick and rocker tried his fortunes a few months in the mines, but not meeting with success, again turned his attention to the sea, and he embarked on another voyage, visiting the Fiji, Friendly, New Hebrides and other islands, Panama, Australia and China. During one of these voyages, he fell in with Christopher Nelson, a Dane by birth, who had been wrecked and thrown among the Fiji cannibals, but rescued and brought away. These two sea-rovers, upon their arrival in San Francisco, went into partnership as Goodall & Nelson, and laid the foundation of a business that rapidly became the first commercial and shipping-house on the coast. In 1870 ex-Governor Perkins, then a successful merchant of Oroville and State Senator from Butte, was added to the firm. In 1876 Mr. Nelson disposed of his interest in the business and was succeeded by Edwin Goodall, a younger brother of the captain, since which time the firm has been known as Goodall, Perkins & Co. The business of this firm now extends from British Columbia on the north to San Diego on the south, and a large fleet of stanch, well equipped steamers are employed by them in the coasting trade. Captain Goodall was married February 20, 1856, to Miss Serene Thayer of New York, and a happy home and group of devoted children have been the fruit of the union. The fact that Senator Stanford selected him as one of the trustees of his munificent gift is one of the best evidences of the sterling worth of his character.

THE Truckee Lumber Company is about to build a new mill at Dog valley. The timber is about all cut near their present mill, and it will be removed further up the valley. Work has already commenced, and the dam which will form a pond is nearly completed.



CHARLES GOODALL.

and the stupid, sneer at that moral courage which pertains only to those whose really great. The explosion of two barrenos at the same time filled the bottom of the mine with sulphurous gases and with a dense smoke from the powder. A shower of stones fell around him, but he was unharmed. Putting his hands to his mouth in the form of a trumpet, he shouted in a tone which reached the mouth of the tiro—*El pegador sin novedad!* A salva of applause and of vivas saluted the valiant *alabado* of the miners. Then they sang the *alabado* (secramental hymn). Standing there, enveloped with clouds of smoke and metralas of stones, he was a magnificent figure. For the third time the tiro resounded with an explosion. The pegador replied with greater energy: *Sin novedad!* This time the salva was furious, and the *alabado* was repeated. Three successive detonations followed at short intervals; but after each he repeated: *Sin novedad!* The enthusiasm rose to frenzy and was manifested in vivas and mad shouts. No one now thought of singing the *alabado*. They were yelling, stamping and vociferating. All the barreteros who were near, the *quebradores*, *fueros* and *pepenadores*, ran to the mouth of the tiro, shouting and applauding. In truth, the man who not only once but several times had thus faced death so heroically, deserved the unbounded admiration with which they were greeting him.

(To be Continued.)

made several visits to the well at various times and had expressed himself as being satisfied, from his own personal observations, of the presence of oil and gas.

Yesterday afternoon an *Independent* reporter met Mr. Beane and asked him how work at the well was progressing.

"Well, we have unpacked the tubing and will start in again to-morrow," was the reply. "By the way," he continued, "there has been a good deal of talk about the well. Now, if you will jump into my buggy I will take you out there and show you what we have."

The reporter accepted the invitation, and in less than ten minutes he was at the well. Mr. Beane called the scribe's attention to several pools of water in the yard that were formed from the overflow from the well. At the edges of the pools a thick scum, of a dark-brown color, had collected on the surface of the water, which looked oily and was greasy to the touch. It is crude paraffine. The surface of the water is also covered with aniline, which, Mr. Beane explained, only comes from rock oil. The reporter was next shown a pile of black sand, a sample of that which had been obtained in boring. The sand was moist, and, like the water, felt greasy. It was impregnated with paraffine. The presence of such quantities of paraffine and the aniline in the water that has been pumped from the well, is, according to the testimony of the best authorities, the surest and best indica-





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SAN FRANCISCO

Saturday Morning, Jan. 7, 1888.

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#### Passing Events.

The year 1888 opens auspiciously, and everywhere in California there are evidences of prosperity. The immense immigration to the State is filling up all the vacant places, and increasing the population in our cities and towns. It is expected that California will make a wonderful advance in material interests this year.

A very heavy rainfall has occurred almost all over the State during the past week. In many places the storm was accompanied by hail and snow. The snow covered the hillsides around the city of San Francisco on Wednesday and Thursday, quite an unusual occurrence in these latitudes.

As we commence Volume LXVI with this number of the PRESS, it will not be out of place to remind our readers that this is a very appropriate time to renew their subscriptions. If they can also bring the paper to the attention of others we shall be obliged.

So much snow has already fallen on the mountains that it is very probable the mining community will have a good water season. So many mills now use water for power in this State that an abundant supply is quite an important matter.

#### Whether to Buy "Prospects" or "Going Concerns."

This Denver Mining Journal takes the ground that it is better for those intending to invest in mines to buy what the English term "a going concern"—that is, a hulkion-producing mine—than a mere "prospect," however promising the latter may be, going on to say that in Colorado those buying and working mines already developed have generally fared much better than they who have hunted after deposits supposed but not absolutely known to exist.

However it may have been in Colorado, this hardly agrees with our experience in California or perhaps elsewhere west of the Rocky mountains. Our opinion is that the buyers and developers of unexplored or but little explored deposits have, as a general thing, come out better than the buyers of mines already exploited and equipped with plant. There have been successes and there have been failures in both cases, but the most satisfactory results have, we think, been reached by those who have experimented with the "prospects." It is in fact but reasonable to expect that such would be the case. Prospectors and miners take up claims for the purpose of selling them, doing only enough exploratory work in most cases to keep good their possessory titles. They are not apt to do even that much unless the claim shows some evidence of value. To suppose that these men, generally such good judges of "indications," would expend what to them are such considerable amounts of labor and money on an entirely or seemingly worthless piece of ground is a very violent presumption. The term "prospect" implies as much as this, conveying the idea that there is in it at least something to hope for.

The claim locator being then the owner of a property, possessing presumably, some value, is the party, one would think, whom intending buyers would first seek out, as he wants to sell his property and can give a good reason for it. He may ask too much for his claim, and in the first instance very likely will, but he cannot grossly misrepresent it, nor can he very well put up a job on the buyer. It would be a sorry sort of expert indeed who could go far wrong in estimating the value of a mere prospect.

Turning now to the "going concern," we find these conditions very different. In the first place it may well be asked, why should the owner of the "going concern" want to sell it, or why sell it at a price that would make it a desirable purchase by another? Of course, it is always possible to give a plausible, and often an entirely valid, reason for this. But when a party has bought a mine and gone to the expense of opening up, outfitting, and bringing it to a profitably productive condition, the above inquiry becomes pertinent, suggesting at the same time the legal aphorism, "caveat emptor," as occasionally the "emptor" discovers when it is too late. If a mistake is made in experting a prospect, no great harm is apt to ensue; but a mistake made in experting an extensive mine with all its appurtenances may be a very grave affair, and that the liability to fall into error is in this latter case greatly increased cannot be denied. Canvassing then, the hazards incident to this class of ventures, the chances of success lie, it seems to us, with the undeveloped mines, difference in first cost being, of course, taken into consideration.

Our Colorado contemporary complains that claim-holders there are in the habit of asking excessive prices for their "prospects," thereby defeating their ready sale and turning capital away from the country. If this be the case these Colorado miners are not the only ones who have the habit of standing in their own light, the practice so complained of being one that obtains very generally throughout the mining regions.

In buying a prospect, especially where the asking price is large, its acceptance by the purchaser should be conditioned on its showing corresponding value under further development, for making which he should be granted ample time. This is the manner in which these inchoate mines should always be dealt with. Such an arrangement ought to prove satisfactory to all concerned; to the buyer, because the property may disclose larger values than were at first expected, and yet involve no advance in the price originally asked for it, while he cannot, in the event of his dropping it, be a

very large loss; and to the seller because he either gets his price for his claim or he gets enough exploratory work done upon it to determine its character without its costing him anything.

The mode of procedure here suggested seems to us so eminently fit that we wonder it has not been more generally adopted by those making mining ventures, especially in California, where there are so many of these prospects for sale, where they can be developed at so little expense and generally show such satisfactory signs of wealth.

#### Sixty-Five Cent Ore Profitable.

In view of the fact that the Spanish mine, Washington Township, Nevada Co., California, has, during the past few months, been making a most remarkable record in the matter of cheap mining and milling, we have published the monthly accounts showing the expenses and profits, in detail. According to the terms of the lease all proceeds must be applied to the payment, pro rata, of the preferred claims against the mine. Mr. F. W. Bradley, the superintendent, has, therefore, to make a monthly statement under oath, and it is from these statements that we have taken the figures published.

However low the cost of milling and mining and the grade of ore in previous months, the record of November is still more startling. The idea of making any profit at all on rock only worth 65 cents per ton will surprise miners everywhere. Yet this was done in November. Moreover, a large amount of rock was crushed, not a mere sample lot, but over 4000 tons, a "working test" that amounts to something. The record for November is as follows:

MINE.			
Thirty days' work produced 4047 tons of ore.			
Cost of Production.	Labor.	Supplies.	Total.
Extracting ore.....	\$679 63	\$196 65	\$876 28
Delivering ore to mill.	193 25	13 69	206 94
Dead work.....	160 90	14 35	175 25
General expense.....	70 70	4 75	75 45
Total.....	\$1044 48	\$229 44	\$1273 92
Cost per ton.....	25 8-10c.	5 6-10c.	31 4-10c.

MILL.			
Twenty-nine days' work reduced 4047 tons of ore.			
Cost of Reduction.	Labor.	Supplies.	Total.
Mill expense.....	\$225 67	\$162 82	\$388 49
Water for power.....	5 00	198 00	203 00
Handling ore.....	177 00	2 40	179 40
General expense.....	70 71	4 75	75 46
Total.....	\$478 38	\$367 97	\$846 35
Cost per ton.....	11 8-10c.	9c.	20 8-10c.

Bullion produced.....	\$2644 57
Total expenses.....	2120 27
Profit.....	\$524 30

This shows the ore to have worked only a trifle over 65 cents per ton. The cost of mining and milling combined was about 52 cents per ton. In working this large amount of ore a net profit of only 13 cents per ton was made, the total profit being \$524 30 on 4047 tons of ore. As we have remarked before, the mine is worked under exceptionally favorable circumstances, and the ore is easily reduced; but it is surprising to know that under any conditions a profit, however small, can be made out of such very low-grade rock. Water-power is used to drive the Huntington mills, but has to be paid for. Miners who own claims of low-grade ore ought to feel encouraged at reading of these results.

**MINING REVIEW.**—We are now preparing our usual annual review of mines and mining for the year 1887, and will publish it as soon as all the statistics are available. We should be pleased to have communications from any of our readers in the mining districts, giving us any notes of progress in their respective camps. In some of the mining districts on this coast there is very little said simply because those interested in the camps do not occasionally write concerning it. We shall be glad to publish in our review any notes which we may receive. We should like them at once, however, since the matter is now being prepared.

**STATISTICS of San Diego for 1887** show that the amount of freight arriving by land and sea during 1887 was 145,000 tons, as compared with 43,000 tons in 1886; 82,500 passengers arrived by land and sea during the year, and 22,000 in 1886; the number of ships arriving in the harbor during 1887 was 1500, and during 1886 350; 153,000,000 feet of lumber arrived in 1887, while in 1886 but 38,000,000 arrived, and in 1885 15,000,000. The value of buildings erected in San Diego and vicinity was \$6,000,000 in 1887 and \$1,250,000 in 1886.

#### Pacific Coast Steel.

In his annual report the Secretary of the Navy called attention to the superiority and excellence of the steel made on the Pacific Coast, which is being used in the construction of the Government cruiser. This is a high compliment to California, and especially to the Pacific Rolling Mills, where the steel was made. The results of the tests show some remarkable features.

The tests of the steel were made by Lieut. Gilmore, U. S. N., who was sent by the Government on special duty during the construction of the cruiser Charleston. Four test pieces are taken from each heat. In the following table, which is from official records, the figures of the average of each four tests are given:

Material.	Tensile Strength. Per Sq. Inch.	Elongation. Per Cent. a.
Angles.....	61,505	30.7 in 8 inches.
".....	60,890	30.54 " "
".....	60,905	30.21 " "
".....	60,175	30.37 " "
Hull rivets.....	54,265	31.69 " "
".....	53,215	31.43 " "
".....	52,445	31.80 " "
Boiler shell rivets.....	60,250	28.07 " "
".....	61,410	29.9 " "
".....	61,600	29.0 " "
Stay rods.....	63,850	24.03 " "
Miscellaneous forgings.....	63,137	24.87 4 " "
Cast-steel stern-post.....	74,670	19.75 3 " "
" ram.....	64,370	18.12 8 " "
" stem.....	61,580	19.2 3.2 " "

The angles are the frames for the ship. The results obtained in ductility are much in excess of that required by the specifications, the requirements being 25 per cent in eight inches. The case is similar with the hull rivets. The superior quality of the rivet material is shown by the fact that no rivets have been lost after being driven into the ship. With ordinary material more or less are broken or defaced. The stay rods are for the boilers, and the figures show the degree of excellence of the steel.

The miscellaneous forgings of steel are used in making different parts of the engines, etc. The Pacific Rolling Mills Company has caused for congratulation in the success it has achieved in making the steel castings, since they give extraordinary results in tensile strength and elongation. It has been the desire in building the Charleston to substitute steel castings for forgings as much as possible, as well as steel castings for iron castings.

The Secretary of the Navy of course has his remarks on the excellence of the steel on the report made by Lieut. Gilmore. The figures we give above we take from a copy of the report in this city. The Rolling-Mill Company have done everything possible to turn out the very best steel, and it is a matter of congratulation that they have succeeded so well.

#### The Yield of the Comstock.

We have received from Dr. James Delavan, mining engineer, of Virginia City, Nev., a compilation of statistics in reference to the Comstock lode, which has been prepared after a lengthy research of all available sources, and the use of an immense amount of figuring. It will be of interest, as the statements can be relied on as correct as can be possibly obtained, therefore we lay it before the readers of the PRESS. The calculations are from the year 1860 to 1st of December, 1887. Total yield of mines on the great Comstock lode from ore reduced at mills, without including slimes and tailings yield, as all that went to the mill-owners and not to the benefit of stockholders, was \$239,219,553.

Dividends paid..... \$126,431,076  
Assessments levied..... 87,615,460  
Dividends above assessments..... 68,815,510  
Amount expended above assessments, proceeds of mine..... 110,783,483  
Total expenditures..... 169,493,943  
Yield of tailings and slimes, net..... 35,000,000  
Total product of mines..... 305,000,000

**COAL** continues scarce and very high, though the market is not as sure as it was a fortnight ago. It is still sufficiently scarce, however, to create a general scramble among dealers for supplies whenever a cargo arrives. Vessels are now being engaged to go to Australia for coal, and as ships are being chartered there for this port, it is hardly probable that the scarcity will become more extreme.

**TUSCARORA MINES.**—The statement recently published to the effect that work on the Navajo Queen, Seal of Nevada and East Grand Prize mines, Tuscarora, Nev., had been suspended for the winter is incorrect. They are pushing work on both the Navajo Queen and Tuscarora Con. and expect to do considerable on the East Grand Prize this winter.



## Publications of the Lick Observatory.

Volume I of the Publications of the Lick Observatory of the University of California has just been issued. It was prepared under the direction of the Lick trustees by Edward S. Holden, LL. D., president of the University and director of the Lick Observatory. The work was printed at the State printing office, and is of excellent typographical appearance. A brief description of the observatory in its present state is given and a short history of the work which has been done. There are several illustrations of the appliances connected with the observatory. The descriptions of the clocks are specially interesting. As a general thing, Americans have to go to Europe for pieces of mechanical work, such as are in small demand here—astronomical clocks, for instance. The only reason is, that in order to get the parts of accurately right dimensions and weight a great deal of time is consumed, and our labor is high-priced, or that it "does not pay" to do much of this work here. There are two clocks by Hohn, and engravings from drawings furnished by the maker give the essential features of the pendulums, etc. The drawings and description of the essential features were asked for by Prof. Holden, and they are presented in this volume, so that any one can make the pieces, the weights, etc., being given. The pendulum of the Frodsham astronomical clock is also figured.

The most valuable portion of the volume to the scientific reader, and what will most interest astronomers, is embraced in the various tables. As a general rule, during the first year of practical work of an observatory, a large amount of time is consumed in preparing necessary tables. But the astronomers will find all this done for them by Prof. Holden. The tables are the most complete ever published, so that the work ought to be reduced with great accuracy. Any one who will examine these tables intelligently will readily understand that Prof. Holden has certainly occupied well what time he could spare from active duties at the University, since he became president.

Following the description of the instruments, the hitherto accomplished work, and the complete meteorological record, came the "Reduction Tables for the Lick Observatory" by George Cary Comstock; latitude  $37^{\circ} 20' 23''$ , 1883." These exceedingly complete tables were computed while Prof. Holden was at the Washburn Observatory at Madison, Wisconsin; as the title states, they were done under Prof. Holden's direction by Mr. Comstock, and comprise all the quantities which can possibly become necessary in the routine computations of the observatory, with several special investigations of a high order. Mr. Comstock, it may be stated, has since become professor of astronomy and mathematics at the State University of Ohio.

From the introductory note and the addendum thereto, we glean the following data concerning the geographical position of the observatory, which have been furnished Prof. Holden by the computing division of the United States Coast and Geodetic Survey, through Prof. George Davidson of this city:

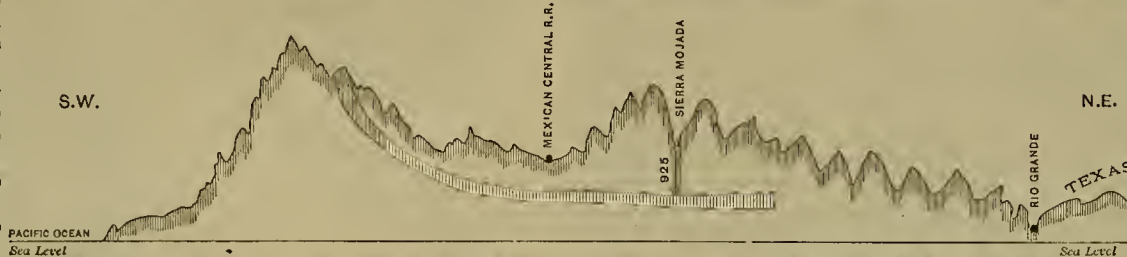
Latitude..... $37^{\circ} 20' 24.75''$   
Longitude..... $121^{\circ} 38' 36.82''$

These are given for the center of the collimating basin of the Fauth Transit in the "Transit House," additional figures are tabulated for similar co-ordinates of all the principal instruments in the different buildings, such being the proportions of this great institution that the "positions" of the instruments in different parts of the building range as much as  $2\frac{1}{2}$  in latitude (230 feet), and  $1\frac{1}{2}$  in longitude (125 feet). The elevation of the top of the small dome (which was the object observed

upon by the different officers of the coast survey) is given by Mr. Scott, the head of the computing division of that bureau, as 1295.31 meters above the half-tide level of the Pacific ocean.

This figure, reduced to the marble floor of the main building, results in an elevation for the observatory of 4209.37 feet. All these figures are part of the standard data of the main triangulation work of the Coast Survey, are free from "local deflection," and must be of exceeding accuracy. At the same time it will be interesting to find from observations at the observatory itself to what extent the plumb-line is inclined by the attraction of the surrounding mountain masses; apparently this has not as yet been investigated.

Table I gives the star factors, *A*, *B*, *C* and *D*, for every  $10'$  of declination from  $47'$  to  $40'$  south declination to north  $80'$ . These are the usual factors for azimuth, level and collimation of the transit instrument; the fourth quantity, *D*, is the numerical value of the tangent of the declination, which is used in the computation by Bessel's method, wherein the "constants" of the transit are supposed to vary but little



SECTION SHOWING HOW PERMEABLE STRATUM FROM MOUNTAINS MIGHT SUPPLY WATER.

and are known. The second part of the same table includes the same factors for every individual star of the Berliner Jahrbuch, computed for the period 1900, and with the changes for 100 years.

Tables III, IV and V comprise extensions of Bessel's well-known refraction tables, with corrections for the atmospheric and barometric conditions prevailing at the altitude of the observatory; also differential refractions in right ascension and declination for the circle and micrometer observations. They are preceded

## A Year of Large Promise.

The new year opens auspiciously for all the leading industries of California, the copious and widely distributed rains that have greeted its advent being of hardly more importance to agriculture than to mining, which latter has, in several of its branches, come to be largely dependent for success on an ample and well-sustained water supply. This apply may now, so far as the miners are concerned, be considered assured, as the snowfall on the mountains has already been heavy. It is these early snows which, becoming impacted, long resist the rays of the sun, and thus keep the mountain streams well replenished until late in the summer. However heavy the snowfall later in the season, it contributes little to that end, since the days then being long and the snow being loose, the heat of the sun causes it to melt rapidly. With so good a stock of what will be old and greatly solidified snow in the spring, a prolonged water season may be considered assured to the miners the coming summer. As a consequence of this favorable condition of things a large and profitable production of bullion may be counted

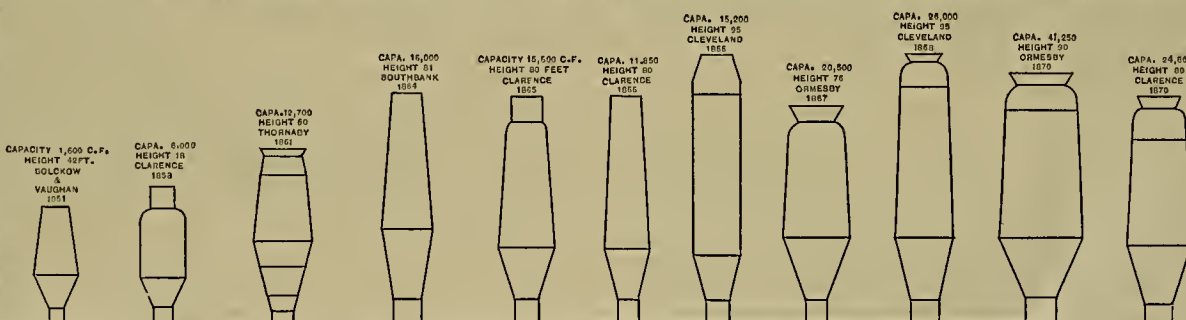
## Artesian Wells in Mexico.

In his description of the Sierra Mojada mining district, Mr. Richard E. Chism discusses the question of water supply for artesian wells at some length, as it is of more or less interest to other Mexican districts similarly situated. He gives the elevations along the Mexican Central R. R. and approximately those of the great sink. He thinks it would be very much within bounds to assume that any water-bearing stratum from the Sierra Madre must pass at least 300 meters below the surface of the "rock," and that therefore, under the Mexican Central R. R. such a stratum, if it exists at all, would be at most 800 meters above the sea level. The horizontal distance from the railroad to the 1500-foot contour on the eastern slope of the Sierra Nevada is about 125 miles, so that if the water-bearing stratum should have its absorbing outcrop at or near that elevation, it would fall about 18.5 feet per mile, or 0.35 per cent. Supposing it to dip eastward from the railroad with a less inclination, say 10.6 feet per mile or 0.2 per cent, it would, under Sierra Mojada 75 miles away, have an elevation above sea level of only 560 meters.

The elevation of Sierra Mojada is 1845 meters, so that any water-bearing stratum from the Sierra Madre must lie at the depth of 925 meters (3034 feet) below the level of the town. This is indicated in the ideal section shown in the engraving. The cut shows an ideal section across Mexico, showing how a permeable stratum of rock from the Sierra Madre might pass under the Sierra Mojada.

It is probable that the water, in passing through the rock strata for such long distances (75 miles in one instance, 200 miles in the other), would lose the greater part of its head; and that at Sierra Mojada it would rise only a comparatively short distance in the bore-hole, and stand, in case of the deeper hole, at about 1600 feet, and in the more shallow hole at about 1900 feet from the surface. Consequently, the water would have to be pumped up from these depths to the surface.

So far as the general discussion is concerned, it could make no difference at what point in the Sierra Mojada valley an experimental bore hole were located, since, theoretically, they are as likely to strike water in one place as in another. Mr. Chism thinks it



VARIOUS FORMS OF ENGLISH SMELTING FURNACES.

by a discussion on the theory by Prof. Comstock, who has elaborated all the terms of the formulae to meet all possible conditions.

Table VI is an extended tabulation of the Sun's parallax in right ascension and declination, with auxiliary lists for extending the tables to other parallaxes of the heavenly bodies, and for adapting the same tables to other observatories.

Table VII gives the hour angles and azimuths of a body in the horizon; and VIII the true zenith distances for the latitude and elevation of the Lick Observatory.

Tables IX to XIV are tabulations of several quantities useful in abridging the work of computation, to be undertaken by Prof. Holden and his assistants; and the six other tables which conclude the list are copied from the Leipzig observations (as stated in the introduction), and do not particularly appertain to the location of the Lick Observatory. A table of corrigenda follows, which covers all the errors detected up to the time of going to press.

Altogether as a contribution to scientific literature the volume is a worthy one, and reflects credit upon its author and the Lick trustees. It may probably be considered as an earnest of the character of future publications of the observatory, so that its high order is one upon which citizens of California may congratulate themselves.

true, but there is reason to believe these mishaps will be less common than heretofore. With each successive year they are, in fact, diminishing in number, having become now so few that they do not count with much force against an industry so widely extended and yielding such grand results in the aggregate. Happen what may, we are firmly of the opinion that looking back at the close of 1888 it will be found that the year has added more to our stock of bullion than was done by any of its predecessors.

CONGRESSMAN MORROW recently called upon Secretary Whitney and discussed the question of the Government purchasing naval stores for consumption on the Pacific Coast in the East, while the same could be procured in San Francisco and other points at the same figures. The Secretary remarked that the injustice of this discrimination against Pacific Coast merchants was apparent, and he would do all in his power to have the matter adjusted.

NEVADA COPPER.—Owing to the revival in the copper market, it is the intention of the company owning the copper mines in Lone Mountain district, Elko Co., Nev., to commence work at once and work them for all they are worth. The deposits of carbonate and oxide of copper ores there are simply immense.

may safely be concluded that there is only a remote possibility of securing water in Sierra Mojada by boring; that if encountered at all, it would be at great depths and would have to be pumped to the surface, and that the probability of the case do not warrant expensive experiment.

## Blast Furnaces.

We have made a number of extracts from Mr. Edward Walsh's paper on the "Irregularities of the Blast Furnace," in which he figures various forms of furnaces. The engraving shows forms of English furnaces, which is from Gruner's "Studies of Blast-Furnace Phenomena." The furnaces are so shown that a comparison of form is readily made. It has previously been stated that there is very little uniformity in the American practice, and, judging from the cuts, there is no more in the English practice. Mr. Walsh himself says that out of some 670 blast furnaces in the United States, there are at least 500 distinct and individual designs. There is, to say the least, a great diversity of opinion as to the proper shape of the blast furnace, though it would seem, after all the experience, that some "survival of the fittest" would have occurred before this.

THE public debt was diminished during the past year \$117,916,000.



## MECHANICAL PROGRESS.

## Babbitt Metal.

We gave quite a lengthy article on babbitt metal in our issue of February 26th last. We now add the following additional items which we find without credit:

This composition of babbitt metal is a question about which there seems to be much confusion and diversity of practice; and the mechanic who undertakes to find out from the makers and users of the alloy just what it is composed of, and in what proportion, will probably receive many and diverse answers.

Many shops make their own babbitt, each one by a formula differing from most all the others; and in this way different specimens may be met with, varying from a mixture of eight parts of lead to one of antimony at one extreme, to one containing no lead and considerable copper and tin at the other. Even the manufacturers and dealers will offer for sale "babbitt metal" in bars at prices ranging from 10 to 75 cents per pound; and they will insist that it is all "babbitt metal," only different qualities.

Now, if any one wishes to use as a lining for boxes an alloy which can be sold as low as 10 cents per pound, of course he should be granted the privilege; but when he calls the stuff babbitt metal he deceives himself or some one else.

We often hear the expression good babbitt, poor babbitt; but there is really but one babbitt metal, and if any alloy is either much better or much worse than that, it is not babbitt, but something else. Different authorities give various formulas for the composition of the metal, but the following is considered to be the standard babbitt metal:

Melt separately 4 parts copper; 12 Banca tin, 8 regulus of antimony. After fusion, add 12 parts tin. This antimony should be mixed with the first portion of the tin, and the copper added after taking the melting-pot from the fire. The surface of the charge should be protected from oxidation by a covering of powdered charcoal.

This mixture constitutes the "hardening," and the babbitt metal is made by fusing one part of this hardening with two parts of tin, thus making the metal consist of 3.7 parts copper, 7.4 parts antimony, and 88.9 parts tin.

## Power in the Future.

What will turn the wheels of our mills 20 years hence? Will it be water, steam or electrical energy? It needs a bold mind to set limits to the inventive genius of this age. A generation that has seen the telephone and the electric light evolved from the study of the inventor can hardly sit in the chair of the skeptic regarding the possible triumphs of minds to come. Pause a moment. Was ever a more marvelous invention thought of or prophesied by an Edgar A. Poe or a Jules Verne than the telephone? Analyze that invention for a moment and see what a palpable contradiction of old-time science it involves. Yet it is now an accepted fact of every-day life.

Edison's Thermo-magnetic Dynamo is but a prophecy of what the scientific minds of this present age regard as the inevitable outcome of scientific research. Edison's invention for utilizing fuel without the intervention of steam is simply a stepping-stone to the era when electrical energy shall take the place of our present incomplete methods of producing power. That the world should have stumbled on for a century in ignorance of the inexhaustible sources of power in electricity all around us, will possibly be the wonder of wonders to the next generation.—*American Miller.*

MECHANICAL PROGRESS.—A commercial contemporary, in endeavoring to show the progress which has been made in mechanical work, gets off the following: "The march of progress is shown by the following statement: It is now possible to construct a complete sewing machine in a minute, or 60 in one hour; a reaper every 15 minutes or less; 300 watches in a day, complete in all their appointments. More important than this even is the fact that it is possible to construct a locomotive in a day. From the plans of a draftsman to the execution of them by the workmen, every wheel, lever, valve and rod may be constructed from the metal to the engine intact. Every rivet may be driven in the boiler, every tube in the tube-sheet, and from the smokestack to the ash-pan a locomotive may be turned out in a working day, completely equipped, ready to do the work of 100 horses." This statement is both misleading and erroneous. No such feats have ever been accomplished or are possible. The error, no doubt, grew out of the statements, which are no doubt facts, that certain firms do turn out so many machines in an hour or a day. But there is a very great difference between turning out a sewing machine from a large manufacturing every minute and constructing one entire in a minute, an hour or a day. The one is quite possible, the other utterly impossible. There are establishments where locomotives can be turned out at the rate of perhaps two a day, but it is utterly impossible, and always will be, to complete a locomotive in a day, or perhaps even in a week.

TO MAKE IRON TAKE A BRIGHT POLISH LIKE STEEL.—Pulverize and dissolve the following

articles in one quart hot water: Blue vitriol, one ounce; borax, one ounce; prussiate of potash, one ounce; charcoal, one ounce; salt, one-half pint; then add one gallon linseed oil; mix well; bring your iron or steel to the proper heat and cool in this solution. It is said the manufacturers of the Judson governor paid \$100 for this receipt, the object being to case-harden iron so that it would take a bright polish like steel.

## What a Good Sawmill Man Requires.

A great many sawmill men lose sight of some of the essential requirements of their business. The following sensible remarks on this subject are reproduced in our columns from the *Timberman*:

One who would run a sawmill successfully in these times must combine many different qualities and possess a knowledge that is not made up altogether of an acquaintance with saw-logs, or even with lumber after it is cut and ready for sale. He must be something of a millwright and a pretty good mechanical engineer in certain points of the theory of that profession, to say the least. He is frequently called upon to judge of the merits of a mill, and needs have such an idea of mechanics that he can tell a good machine from one that is not good—it is to be supposed, of course, that there are no absolutely bad ones in market. And this requires faculties that are trained in criticism and discrimination; that are quick to note the good and bad points of any special device and to judge its effectiveness and economy. As a lumberman remarked the other day, a buyer of machinery is something like the judge of a court, whose business it is to hear all sides fully and then decide according to his idea of what is right. The millman of experience looks into every new machine that is presented to him, carefully listening to all that is said in its favor, then to what the makers of other similar machines have to offer in their behalf, finally deciding upon his purchase when he has settled in his own mind, and "on the evidence," which one will best suit his requirements. That this calls for high order of judicial talent no one will deny; and when it is remembered that a millman's profits are but the result of successful economy and that a failure in this regard is pretty surely a failure altogether, it is apparent that he can afford to make but few mistakes. The high efficiency to which sawmills have attained is very largely due to the fact that he does make but few mistakes.

CIRCULAR SAWS FOR CUTTING METALS.—There probably is not an intelligent sawmill man in the United States who is not familiar with the inserted-tooth saws for cutting lumber; but few of them, perhaps, are aware that our English relations have inserted-tooth saws for cutting iron. One of these machines, as recently illustrated and described in a London engineering journal, has a saw composed of a circular steel tool-holder or plate, eight feet in diameter and one inch thick, having recesses on its circumference to receive special tools which are made with a flat V groove on one side to prevent lateral movement; these cutters are held in position by steel wedges, the circumferential adjustment being made by set screws, and they are adjusted to cut alternately on this face and the edge to give the required clearance. The face tools are arranged to cut in steps so that each one has its own work to do instead of following in the groove of the preceding tool; a special gauge is provided for grinding and setting each tool. The tool plate is carried on the end of a very strong steel spindle running in hard gun-metal bearings, the one nearest the plate being arranged with thrust collars to prevent any side play. The spindle is driven by a massive worm and wheel. The saw will cut through 12-inch steel castings at the rate of seven inches per hour.—*Wood-Worker.*

AMERICAN PLATE GLASS.—It is claimed that the largest and best plates of glass in the world are now made in Pittsburgh, and that difficulty often arises in their transportation owing to their size, the railroad tunnels not admitting them. Two plates, 14x16 feet, were recently ordered for use in a Philadelphia building, and it was found to be impossible to get rail transportation for them. Arrangements were therefore made to have them shipped by river to New Orleans and thence by sea to Philadelphia.

WISCONSIN SENDING ENGINES TO RHODE ISLAND.—Wisconsin machine shops turn out engines for Rhode Island manufacturers. The latest engine furnished was an enormous one, the fly-wheel 32 feet in diameter, and the face nine feet three inches. The largest of four steam cylinders recently furnished has a diameter through which a tall man with a silk hat on could walk. The Western machine shops are teaching the Eastern shops to do big things.

TO DETECT ACIDS IN LUBRICATING OILS.—Acids in lubricating oils can be detected as follows: By analyzing in a laboratory, or by putting the sample to be tested in a clear glass bottle with a copper wire running down through the cork air-tight. Stand the whole in a sunny place and leave for two or three weeks; then if on removal verdigris or green rust be on the copper there is an acid in the oil. This is a rough, effective test for engine-room use.

## SCIENTIFIC PROGRESS

## The Three Forces—Physical, Vital and Psychic.

[No. 14.]

[Written for the Press.]

Muller, a Danish naturalist, observed almost a century ago that a certain marine worm was able to divide itself into two parts and on some occasions into four; these parts after separation continued to live. The oldest part, i.e., that nearest the head, did not contain any eggs. Eggs were confined to those parts which became separated.

Milne-Edwards\* has confirmed Muller's observation. We give an example from him of the *Myrianida fasciata*. It was discovered by him and is described in his "Voyage en Sicile," pl. vii, fig. 65. No. 1, oldest, No. 6, youngest.



There are in this worm no less than six young attached to the older one, and all developing at the same time. Those farthest from the head of the original stock were the oldest, and each was possessed of a certain number of segments and a pair of eyes. The oldest has more rings in proportion to its age; these keep forming during the development of the animal; the joints of the first-formed young are developed between the last joint of the old stock and the one before it. The next oldest is formed by the successive appearance of a series of joints between the head of the first young and what was the next to the last joint of the parent, and so on. This mode of separation has been termed fissiparation. (From *fissus*, divided, and *gemmatus*, budded; a growth by the hudding and dividing of a compound body.)

To the rings of this body are attached appendages for propulsion; these also serve the purpose of gills. They are enabled to perform the function of breathing through having minute branches of the bloodvessels distributed through them. The intestines extend right through the body, and is surrounded by a network of bloodvessels. All these bloodvessels are connected with a larger, canal-like one, which runs along the back of the intestine; this is called the heart. A cord of nervous tissue runs from joint to joint, and forms a small ganglion at each. The principal ganglion (the early indication of a brain) is situated in the head; this is connected with the *nervous collar*, near the throat, which is common in all the lower types. The position of the brain with regard to the nervous system, as seen in the different types, will be given with a complete set of diagrams when we come to the vertebrate series.

Three classes of facts lead us to the conclusion that all articulate animals are composed from end to end of homologous segments: 1. The correspondence in the successive segments of their parts. 2. The correspondence as it exists in the embryonic or larval articulates animal in even a more marked condition. 3. The maintenance of such correspondences in some type, which are absent in type otherwise near akin to them. We have in the *Articulata* a longitudinal integration (in the *Calenterata* and *Mollusca* we have seen that there is a clustered and branched integration). This longitudinal integration is still observable as we ascend to the higher insects, as we hope to make plain in our next paper.

\*Henri Milne-Edwards, who was born at Bruges, 1800, is one of the most eminent representatives of the French school of Natural History. As President of the Faculté des Sciences he has done much to advance the study of comparative Anatomy and Zoology in France. His principal works are: "A Monograph of the Crustacea" (1837-1841); "Elements of Zoology," 4 vols., 600 illus.; and "Comparative Anatomy of Men and Animals" (1856-1857). One of the profoundest naturalists of the age. Such is the general verdict.

(To be Continued.)

THE THEORY OF THE TELEPHONE.—M. Coran has presented to the French Academy a memoir by M. E. Mercadier, on the theory of the telephone. M. Mercadier maintains that the transmission of articulate speech is chiefly, if not solely, the result of molecular motion in the plate of the receiver. Vibrations of the plate as a whole are only capable of yielding a single tone and its harmonics; this tone remains

unaltered when the plate is supported at various points which are nodal points for this particular note; but under these circumstances the transmission of other tones is much lessened. Such an instrument M. Mercadier calls a monotelephone. On the other hand, a diaphragm supported in such a manner as to be incapable of performing transversal vibration is still able to transmit speech with perfect clearness, although with considerable diminution of intensity.

## Industrial Prizes in France.

The French *Société d'Encouragement* offers prizes for discoveries and inventions which are of value to French industry. Among them are the following:

Prizes, \$200 each:

1. For the utilization of residue in factories.
2. For the discovery of a new alloy for industrial purposes.

3. For the useful application of metals which have hitherto been only used to a limited extent for industrial purposes.

4. For the construction of a heating appliance to produce, in small industrial workshops, elevated temperatures by a quick and economical method.

Prizes of \$400 each:

1. For a small motor for workshops, acting for itself, or in connection with a larger factory.

2. For improvements in the usual form of grain-mills.

3. For a motor for heavy oils.

Prizes of \$600 each:

1. For a mode of transmitting natural mechanical forces over long distances, when their immediate utilization is impossible.

2. For the manufacture of glasses for chemical purposes.

3. For the construction of a simple and solid appliance which will indicate the progress of a train at any distance, in a reliable, automatic, and regular manner.

Models, etc., must be sent to the secretary of this society, 44 Rue de Rennes, Paris. Those who wish to compete are reminded that the communication of processes to the society does not afford them the protection of a patent, which should be applied for before they enter for competition.

UTILIZATION OF FIRE DAMP.—It is very interesting to see fire-damp, the most dreaded enemy of miners, reduced by the genius of man to be his agent and servant, as has been done in Germany recently. The Wurm coal mines, near Aix-la-Chapelle, are particularly noted for the amount of fire-damp produced in them, and the minutest precautions had to be taken to prevent dangers that, notwithstanding this, were to be feared. Mr. Hilt, director of the mines, undertook the work. He constructed a line of piping that ran in front of all the centers of work and ended in a main pipe connected at the surface with a powerful suction pump. But it was not enough to get rid of the noxious gas with money—it was necessary to utilize it; and so Mr. Hilt conceived the ingenious idea of causing the conduit to end in a gasometer. Upon isolating the latter, and placing wire gauzes here and there in the conduit, he was enabled to lead the gas to the furnace of two generators and use it to help heat them. We are obtaining, says the director, 30,500 cubic feet of fire-damp, which distill 263 cubic feet of water. On uniting the fire-damp of all our exploitations, we shall have 64 cubic feet per minute, and shall be able to distill 5260 cubic feet of water per 24 hours. The utilization of fire-damp thus stored may become advantageous from a commercial point of view. It may serve not only for gas motors, but also, with well-constructed burners, for lighting purposes.—*La Nature.*

INCREASING USE OF BISULPHIDE OF CARBON.—M. Pasteur anticipates that bisulphide of carbon will become the most efficacious of all antiseptics, as it is also the cheapest, costing but a fraction of a penny per pound in large quantity. It is also the best insecticide known, and for this purpose may perhaps be useful in preserving woodwork in tropical countries. Some idea of the use it is already put to may be gathered from the fact that over 8,000,000 pounds of the substance are used annually to check the ravages of phyloxera. Carbon bisulphide, as first produced, is about as foul-smelling a compound as it is possible to find; but it is capable of purification till all offensive odor is removed and it is sufficiently pure in smell almost to mix with a perfume.

THE MIRAGE OF SOUND.—M. Fizeau, of the French Academy of Sciences, calls attention to a curious acoustic phenomenon, which is sometimes observed at sea, and to which, from its analogy to the well-known phenomena of light, he terms the "mirage of sound." Under the influence of strata of air of various temperatures, he finds that the sound waves may be deflected upward to a very marked extent. He considers this phenomenon responsible for the numerous recent collisions between ships provided with powerful fog-signals.

FLEXIBLE GLASS.—What is termed flexible glass is a useful product just introduced. Paper of proper thickness is rendered transparent by soaking in copal varnish, and, when dry, is polished, rubbed with pumice-stone, and a layer of soluble glass is applied and rubbed with salt. The surface is as perfect as glass.



## ENGINEERING NOTES.

**MARINE ENGINE ECONOMY.—**INTERESTING EXPERIMENTS.—An interesting example of the comparative economy of the old and more modern styles of oscillating marine engines was lately furnished by an instance quoted by J. W. T. Harvey, before the engineering section of the Bristol Naturalists' Society. The *Juno* was originally worked with a jet condenser; after a time this was replaced by a surface condenser, and finally the engines were compounded. Thus we have the same vessel working under three different conditions, and any alteration of coal consumption must be due to the changes in her machinery. The engines originally worked at 30 lb. per square inch, and indicated 1605-horse power; they drove the vessel at 14.1 knots, using 92 tons of coal per voyage. Subsequently new boilers and a surface condenser were fitted to the ship, the pressure still being 30 lb.; the same horse-power and speed were then maintained with a consumption of 8½ tons of coal per voyage, a saving of 7½ tons or 9 per cent. As competition in the carrying trade became keener this coal consumption could not be afforded, and it was determined to compound the engines as inexpensively as possible. One of the existing 60-in. cylinders was replaced by another of 40 in. in diameter, and this together with two sets of link motion, two feed pumps, a steam starting engine, and a pair of cylindrical boilers working at 50 lb. pressure, constituted the whole of the new parts. The engines now gave 1270-horse power, or 335-horse power less than before, and drove the ship at 13.4 knots, or 7 knots slower, on a consumption of 49 tons of coal per voyage. The coal consumption per horse-power therefore varied under the three conditions as 100:91:67. The consumption per voyage varied as 100:91:53.—*Engineering*.

**THE GREAT CANAL SCHEME OF THE ORIENT.**—The proposed canal between India and Europe by way of the Euphrates Valley, the Persian Gulf and Syria, has been discussed in all its bearings by the French Academy of Sciences, a communication on the subject from M. Eude forming the basis of the discussion. The line marked out by M. Eude is stated to be what was the great route of commerce in ancient times, hence the founding and development of Alexandria diverted it on Suez, eventually leading to the Suez canal. This new route is avowedly put forth as a parallel way to that of Suez, and the project contemplates, in fact, a canal with a double aim, viz., a canal of irrigation and navigation—and by which means it is expected that fertility will be restored to those wastes. The plan is to create a river from Soueidiyah to the Persian Gulf, by making the Euphrates flow to the Mediterranean by Aleppo and Antioch; from Beles, in deepening the river from Beles to Felondjah, near ancient Babylon; in passing from the Euphrates to the Tigris by the canal of Saklavijah; and lastly, in descending the Tigris from Bagdad to Kurnah, Bassora, and Fao on the Gulf. Such a canal would shorten the going and coming voyage to Bombay by six days; and, notwithstanding the vastness of the work, the engineering difficulties are not considered extraordinary, except the stony banks of Abou-Said and Kerheleh, which, however, would not resist modern appliances.

**ENGINEERING INDUSTRIES IN SWEDEN.**—Several of the large Swedish engineering establishments appear to be well off for work at present. The Atlas Engineering Co. has just contracted with the Blekinge Railway Co. for 10 passenger and 85 goods carriages. The Metals Works have just completed another delivery of locomotives to the State railways; seven more are to be delivered on the same contract. The Bergsund Engineering Co. is busy with three mining boats for the Royal Swedish Navy, that have to be ready by the spring. The Ljusne Engineering Co. has just delivered a large new steam pump to the Kunsankoski Co., Uti, in Finland. The construction is quite a new one, claiming to possess several advantages over the older models. The same well-known firm has also delivered a portable steam fire-engine to the South Ljusne Iron Works within the last few days, which gave the greatest satisfaction at the trial. Some of the steel and iron works also appear to be well filled with orders.

**THE CHANNEL TUNNEL.**—The long pending project of a tunnel under the channel between England and France is still agitating the British mind, and the "old crusted-port wine gentry" are still denouncing it as if it were a diabolical plot to hand the country over to the terrible Gauls. But in spite of the singular terror with which the thought of possible railway connection with the continent inspires the old fogies and which has for years succeeded in defeating permissive legislation, public opinion is said to be growing more favorable to the enterprise and the projectors have the capital ready to proceed with the work as soon as the Government will consent. It is a singular spectacle in this progressive century to see the people of a powerful nation actually prohibiting a great engineering work simply for fear that another nation might take advantage of the facilities for access through a hole in the ground and come over and whip them.

**A ONE-INCH SHAFT.**—A one-inch wrought-iron shaft eight feet long will transmit five-horse power, running about 600 revolutions per minute.

## USEFUL INFORMATION.

## Strange Disintegration of Marble.

Some few weeks ago, water was found trickling through the roof of Girard College, Philadelphia, which is constructed of marble. An examination showed that the joints of the great marble slabs which formed the roof were parting. The stones, when placed in position in 1845-46, had been dovetailed together, and their parting was supposed to be caused by the constant use of the roof by crowds of visitors as a point of observation.

As a result of this onerous observation, says the *Philadelphia Press*, workmen were sent to repair the roof by forcing the slabs into position again. Then the surprising discovery was made that the marble itself was crumbling. The stone in all parts of the great flat surface was so decomposed that a piece an inch square could be crushed between the fingers. In fact, the whole roof seemed to have become little more than a mass of lime.

When this curious phenomenon was reported to the Board of City Trustees there was an animated but quiet discussion of what should be done. To build a new marble roof would cost nearly \$200,000, with the prospect that it would only decay in turn. Careful examination showed that the walls and steps of the college building had not been affected as was the roof. It was finally decided to cover the marble roof with heavy sheet tin, and the contract for this work has been awarded at a price of about \$9000. The necessary wood-work for the metal roof is already in place.

## The Only Marble Roof.

Naturally the discovery that the marble had rotted until it was thoroughly porous has caused a great deal of comment among builders. Marble roofs are not common. In fact that of Girard College is the only one in the city. But there are many buildings of marble, notably the new City hall, and the query was made whether the citizens of Philadelphia are to awake some morning after a rainstorm to discover a mass of slaked lime in the middle of Penn square. If a marble roof should thus decay, why should not marble walls? Might it not become necessary to erect a huge canopy of tin to house the public buildings?

Architect Windrum, however, after a careful examination, assured the Committee on Buildings of the Board of City Trustees that the rest of the college was in no danger.

## The Cause of the Disintegration.

Joseph L. Caven of the Board of Trustees says: "There is no cause for alarm whatever. Marble is carbonate of lime. The air in that region has contained sufficient acid, as a result of burning anthracite coal, to disintegrate, gradually, the carbonate of lime. The same effect is not perceptible upon the walls nor upon the Corinthian columns. The reason is that the roof of the college has a very slight pitch. In fact, it is almost flat, and while its slope is steep enough to shed water, dampness easily clings to it and aids the action of the air. Then, too, visitors to the college have always been allowed to go upon the roof. The view there is very extensive, and the visitors walked all over the top of the building. When you remember that this has been going on for 40 years, it is not surprising that the marble slabs are affected."

## About "Salt."

"Let your speech be always with grace, seasoned with salt."

For relief from heartburn or dyspepsia, drink a little cold water in which has been dissolved a teaspoonful of salt.

Sprinkling salt on the tops and at the bottoms of garden walks is said to keep snails from climbing up or down.

For weeds in the grass, put a pinch or two of salt in the middle of each, and, unless a shower washes it off, it will kill the weeds.

Ink stains on linen can be taken out if the stain is first washed in strong salt and water and then sponged with lemon juice.

In a basin of water, salt of course will fall to the bottom; so never soak salt fish with the skin side down, as the salt falls to the skin and remains there.

For stains on the hands nothing is better than a little salt with enough lemon juice to moisten it, rubbed on the spots and then washed off in clear water.

Salt and mustard, a teaspoonful of each, followed with sweet oil, melted butter or milk, is the antidote for Fowler's solution, white precipitate of arsenic.

For weeds in pavements or gravel-walks, make a strong brine of coarse salt and boiling water; put the brine in a sprinkling-can, and water the weeds thoroughly, being careful not to let any of the brine get on the grass, or it will kill it too.

If a chimney or flue catch on fire, close all windows and doors first, then hang a blanket in front of the grate to exclude all air. Water should never be poured down the chimney, as it spoils the carpets. Coarse salt thrown down the flue is much better.—*Good Housekeeping*.

**A READY WAY TO MAKE ICE.**—Take a cylindrical earthen vessel and pour into it 3½ ounces of commercial sulphuric acid and 1½ ounces of water, and then add one ounce of powdered sulphate of soda. In the center of

this mixture place a small vessel containing the water to be frozen; then cover the vessel and, if possible, revolve the whole with a gentle motion. In a few moments the water in the smaller vessel will be converted into ice. The same mixture can be used a second or third time for making a block of ice. The operation should, if possible, be performed in a cool place—in a cellar, for example.

**THE FIRST WIRE BELTING.**—The first piece of belting made with wire has been made at Beaver Falls, in the adjoining county of Beaver, Pa., by J. E. Emmerson and Thomas Midgeley, under patents taken out by the latter. The piece is 40 feet long and 4 inches wide, and is made from No. 20 steel wire. It is as pliable as leather, in fact more so, and will wrap around a 1 or 2-inch shaft without straining or bending the wire. The link arrangement is similar to that of the flat gold chains worn by gentlemen and ladies, and presents a handsome appearance. The sample shown has a tensile strength of five tons. As soon as the proper machinery can be manufactured for making this belting it will be put upon the market for sale.

**MANAGING LAMP WICKS.**—Sometimes the lamp wick absolutely refuses to be turned up in an orderly manner. It will seem firmly wedged on one side, while the other runs up in a point, causing weariness and vexation of spirit. To overcome this difficulty, take a new wick, draw out a single thread near the selvage, and the wick will be found quite tractable when introduced into the burner. The cogs will take it up properly, and it will appear in good form and give an even flame when lighted.

**THE PHOTOGRAPHER'S LENS** is more discerning than the naked eye. A recent photograph of a figure-painting by an American artist shows that a woman's gown was first painted a hue and texture very different from that finally chosen, the underlying brushwork appearing plainly in the photograph, though not seen by the most attentive observer of the original picture. In like manner photography reveals stars that to the human eye are not distinguishable from nebulous matter.

**TO CLEAN AND POLISH A PARLOR ORGAN OR PIANO,** wash it with a soft old silk handkerchief wrung out in lukewarm suds made with best Castile soap; then dry immediately and rub with chamois-skin. If the instrument is very much scratched and defaced, rub with good furniture polish and polish for a long time with dry chamois or a piece of soft silk.

**TO POLISH PLATE GLASS** and remove slight scratches, rub the surface gently, first with a clean pad of white cotton wool, and afterward with a pad covered over with cotton velvet which has been charged with fine rouge. The surface will, under this treatment, acquire a polish of great brilliancy, quite free from any scratches.

**A CURIOUS FEATURE** of the day is that while iron is dull and declining all the leading metals—as copper, tin, spelter, etc.—are excited and advancing in price. Of course speculation has much to do with the situation in metals, but even speculation must have some basis to rest upon.

**LEATHER CASTERS.**—Casters made of leather are said to be a new invention. Heavy furniture which must be moved often for sweeping soon wears bad places on floors or carpets, and a solid sole-leather caster must prove a blessing to housekeepers.

**TO POLISH RUBBER.**—Manufacturers of rubber articles get the fine polish on them, which is so generally seen, by using fine pumice and a stiff brush, finishing off with whiting and a soft brush. Rotten-stone and oil are sometimes used.

## GOOD HEALTH.

## A Few Facts About Tobacco.

We deem it our duty to point out to those contemplating marriage the curse entailed through using tobacco. We have heard many assert that the laws of heredity were "all moonshine," yet we only testify of "that we do know."

Years ago, a young man well known to us, married. Children were born until they had seven sons, but none of these boys lived to be over three years of age—usually, not over one—all dying with what the physicians termed "brain trouble." When the fifth child died, several medical gentlemen held an autopsy, deciding: Brain trouble resulting through heredity. Cause, excessive use of tobacco by the father. We were present when the last one died, and we shall never forget the mother's agony as she cried out, "Oh, my God! must poor little Georgie go as the rest have done?" Who can imagine the feelings of those parents as they stood by the row of little graves—seven of them—only think of it? Could the luxury of a self-indulgence appease the sorrow of so great a bereavement?

We know of another family, whose father not only uses tobacco excessively, but intoxicates also; three of his sons cannot walk, hav-

ing to use wheeled-chairs as their only means of locomotion. The boys appeared to be all right until about the age of seven, when a slight paralysis commenced, increasing more rapidly at about 13, when all use of the lower limbs ceased. These cases have resulted—or have been pronounced to have resulted—through heredity; tobacco the chief cause.

Still another father whom we know, has, through excessive use of tobacco, entailed kleptomania upon his three sons. The father is an honest, esteemed citizen, descending from a goodly line of ancestors; the mother, a most estimable woman, but the sons will take tobacco wherever they can find it; and in case they do not come across it, take something which will hurt it.

In the face of these facts would it be wise for a young woman to marry a tobacco user? Is it reasonable for a young man to form a habit entailing such results? These are not isolated cases. We know of others where there were not so many cursed in one family, yet one victim, at least, was sacrificed on the altar of self-indulgence. Tobacco-using is not safe. Many a young man has his mental faculties clouded, the "bright boy" merging into a very commonplace man, just because of it. We have had young men confess to us that tobacco had destroyed, in a great measure, their will-power.—*Exchange*.

**TREATMENT OF MALARIA.**—Malaria is being successfully treated in the medical stations of the Punjab with picrate of ammonia. The usual dose is from one-eighth of a grain to one and a half grains four or five times a day in a pill. Half a grain is a fair average dose. Thus given the result is soon visible. In the great majority of the cases treated one-half grain doses in the interval prevented the recurrence of the next attack of the fever, while in about 20 per cent of the patients two or three attacks followed before the fever ceased. In only one case of quartan ague, despite large doses of the salt, the fever recurred for six periods, gradually diminishing in intensity and then yielding to it. It is equally successful in all the forms of ague, but it is a curious fact that the cases in which it failed to cure were all of the tertian variety.

**SMALLPOX PROPHYLACTIC.**—One of the best preventives against smallpox is cream of tartar. Dissolve two teaspoonfuls in a glass of water and drink half of it before breakfast and half before the last meal. An agreeable beverage may be made by taking a half-ounce of cream of tartar, a lemon sliced, and half a pound of sugar. Add three pints of water, let it stand for half an hour and strain. This drink may be taken with advantage as a preventive. Among the Chinese, cream of tartar is believed to be a positive preventive of smallpox. Our physicians are now furnished with the best of vaccine, and there should be no delay in taking this first precautionary measure. A reasonable degree of care in keeping the system in good condition should be observed at all times, but especially when in fear of this dread disease.

**DIPHTHERIA FROM ANIMALS.**—A few weeks ago the *Martinez Gazette* mentioned the death of a horse which had all the symptoms of diphtheria. This account met the eye of W. M. Eddy of Santa Barbara, and he has written to the above-named paper as follows: "I am confident that horses and other animals can and do have diphtheria, and that cases of the disease among children that are generally considered sporadic are simply instances where it has been taken from animals. I am confident that two cases of diphtheria in my family were contracted from a horse and a dog respectively, and my opinion is concurred in by our family physician. Warn your people that the dreadful disease is as likely to be contracted from horses as from human beings."

**WORMS IN EGGS—DON'T EAT THEM RAW.**—Professor Liehe adduces reliable data in answer to the question whether living worms are to be found in hen's eggs. A short time previously his sister had found a round, threadlike worm, the length of a little finger, in the white of an egg. It moved itself in a very lively manner. She at once took the white of the egg to a druggist, who put the worm in alcohol. Professor Mohius of Kiel decided that the specimen was an example of the thread-worm of fowls—*Heterakis inflexa*—often found in the small intestine of the domestic hen. Only a few instances of the existence of the same in the white of the egg have been recorded.

**A GERMAN LUXURY.**—A powder of pine needles is now prepared in Germany, and is becoming popular for use in baths. A half pound or a pound of the powder is allowed to digest in lukewarm water for a few minutes, when the bath is ready. The principles extracted act upon the skin as a tonic and antiseptic, and the baths are prescribed for rheumatic complaints, gout, certain skin diseases, and for invigorating the system generally. The powder is also used for fumigation in chest affections, etc., or as an antiseptic a little may be placed on a hot cloth and carried about the room.

**THE VOMITING CENTER.**—Prof. Tumas, a European physiologist, has shown that vomiting is the result of irritation of a space in the medulla oblongata about one-fifth of an inch long and one-twelfth wide, and believes that the brains of ruminants, rodents and other non-vomiting animals lack this "vomiting center."



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Butte.

**QUARTZ MINES.**—Gridley Herald, Dec. 29: From a reliable source we learn that a general revival of operations is dawning in the quartz district tributary to Brown's Valley. The Jefferson and Danbrogue ledges, from which nearly \$1,000,000 has been taken out, will be reopened this spring, as will also the Dunderberg. The latter property is owned by Messrs. Burroughs & Hibbert, who are now refitting the mine with new machinery throughout. Mining experts consider the outlook for the district as very flattering.

## Calaveras.

**MURPHYS.**—Cor. County Record, Dec. 29: In my last letter I made mention of mining property belonging to Morse and Stone on the outskirts of town. Since then I have gleaned the fuller details concerning these mines, four in number, Hidden Treasure, Piety Hill, Poverty Hill, and the Matteson Extension, and the recent assays and the working of a ton of quartz at the Selby smelting works at Valjejo. These mines give promise of great fertility in their precious metal-producing qualities, and sooner or later will attract the attention of mining men. The late assays and working tests place these mines among the foremost for average richness of quartz. The 2000 pounds worked at the Selby works yielded the handsome sum of \$707 in gold and silver clear of all expenses. Assays have reached a much higher figure than these, and when it is understood that quartz is worked up to a fraction of the assay at the Selby works, the best results can be expected from these mines. As high as 25 per cent in silver is obtained in assays.

## Fresno.

**THE MUSICK.**—Fresno Republican, Dec. 24: W. B. Tucker, superintendent of the Musick gold mine, which is situated on Dinkey creek between the Kings and San Joaquin rivers, was in this city yesterday, bringing with him several specimens of ore for the inspection of Messrs. Ingalls, Church and Beall of this city, the owners of the property. The specimens were taken from the 250-foot level, and it is thought will assay something over \$100 to the ton. A large force of men is at work sinking new shafts and driving new tunnels, and by spring they will have an immense amount of rock waiting for the stamp-mill to be built as soon as the snow melts. The owners have so much confidence in the future of the mine that it is not for sale.

## Plumas.

**PROSPECTING.**—Greenville Bulletin, Dec. 30: During the past six years, T. K. Chapin and J. J. Fisher have been prospecting some quartz veins on the ridge running north of the Southern Eureka, which were worked, they inform us, over 20 years ago, then being known as the White Ledge and the Yellow Jacket. They have run over 600 feet of tunnel and drifts and sunk over 150 feet of shafts, mostly on the west side of the ridge, where they have found very rich float at different times. They have lately been running a new tunnel from the north end of the ridge, which will strike the old Yellow Jacket Ledge, under the old works, at a depth of about 80 feet, and the White Ledge 150 or 160 feet deep. They have also a claim called the Monumental, north of North Canyon, on which they have sunk a shaft on the ledge. They have also run a tunnel striking the vein at a depth of 40 feet. From this tunnel they have sunk 24 feet on the ledge, and run various drifts and cuts. All of this work has been done on what appears to be the south end of the chimney, as the rock to the north prospects well, while to the south but little gold is found. On this claim they have started a new tunnel to strike the ledge 75 feet further north than the old works, and at a depth of from 60 to 70 feet from the surface.

**NORTH FORK ITEMS.**—A. N. Cameron is over from North Fork. He will resume work in the tunnel on his claim after the holidays. John Ellis has sold his interest in the Malvern Hill claim to Chas. Lee, and has gone to Chico. The Glazier mine is reported to be paying well now. F. Sorsoli has purchased an interest in the B. Piazzouia claim, and work is being prosecuted. Benham is pushing work on his mine at Malvern Hill.

## Nevada.

**NEW MILL.**—Foothill Tidings, Dec. 30: The new mill at the Champion mine, Nevada mining district, was started up Wednesday and everything was well. After New Year's Day will be kept going constantly. Mine yielding good quality ore. Force of men employed is small but will be increased.

**EVENING STAR MINE.**—Grass Valley Union, Dec. 31: The directors of this mining company, who have been in town the greater part of the week, examining the property, have determined to proceed with the building of hoisting works and mill with as little delay as possible, and keep up the work of development on the mine, which has given encouraging results from the work already done upon it. Unfavorable weather may retard the proposed improvements somewhat at this season of the year, but advantage will be taken of all the good weather that offers. The Evening Star location is on the south side of Squirrel creek, near Deadman's Flat, and about three-fourths of a mile southwest from the North Star mine. The company is a strong one, and the owners are very favorably impressed with the value of the quartz mining resources of the district, and believe that it offers better inducements for investment than any other mining section of the State.

**A RICH STRIKE.**—North San Juan Times, Dec. 30: Some months ago Frank H. Bell, J. G. Hall, Joe Hustler and A. S. Bigelow located a quartz ledge at or near the Badger Hill diggings, in the upper part of this township, which give promise of being another Delhi. The company have been quietly at work on their claim prospecting it, and they have driven a tunnel into and along the ledge for about 65 feet. While running this tunnel a chute of rock of great richness was struck wherein free gold is discernible in large quantities. The ledge is three feet in width 80 feet below the surface and all of it will pay for milling. This strike has created quite a sensation in and around Cherokee

and now prospecting for paying ledges is all the go. The owners have christened the mine the Success.

**THE EL DORADO.**—A company of Nevada gentlemen, among whom are George C. Gaylord, Dr. H. S. Welch and Wallace J. Williams, have for some time past been prospecting for quartz in the vicinity of the General Grant mine. A letter from one of these gentlemen informs us that a rumor is afloat that in the course of operations the El Dorado Company had developed in their prospect tunnel a two-foot ledge of fine appearance. This ledge is not the one the company is looking for, but is welcome all the same if there is anything in it.

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## Shasta.

**WINTHROP.**—Shasta Democrat, Dec. 29: The old Winthrop mine, at Copper City, started up again last week and is running a day and night shift. The prospects are very flattering, a rich body of ore having been struck recently. The owners, Jones, Spruance & Stanley, it is hoped, will soon reap a rich reward for their pluck and perseverance. Mr. C. E. DeForest has just returned from Squaw creek, where he has been for the last two weeks working ore in that section as an experimental test. Two tons of ore from the Carson mine, which was left over, were worked in the Cressius mill and yielded \$29 per ton. Ten tons were then worked from the Clipper mine, which yielded \$425, or \$42.50 per ton. Mr. DeForest reports the ledge on the Cressius mine widening and the Clipper as looking well.

## Sierra.

**CHANGE OF MANAGEMENT.**—Foothill Tidings, Dec. 24: New York parties own the Pilgrim mine of Sierra county, situated about eight miles above Forest City. Although the Pilgrim has a good ledge and all facilities for operating, including a 20-stamp mill, the mine has not paid, and recently a change of management was determined upon. Major Fitzgerald, book-keeper at the Brunswick mine of this place, has been appointed superintendent of the Pilgrim and B. A. Penhall is to be foreman. The first-named gentleman is not widely known in this district as a mining man, but his associates vouch for his capability to fulfill the duties incumbent upon the superintendence of a mine. Mr. Penhall is universally known as a practical miner of long experience and a good man in all respects. In his departure Grass Valley will lose one of its most indefatigable prospectors.

**GRAND PRIZE.**—Mountain Messenger, Dec. 29: The Grand Prize Co. are running a tunnel for their gravel lead, that is in quite a distance. They have one of the most promising drift mines in Northern Sierra.

## Trinity.

**A GOOD CLEANUP.**—Journal, Dec. 31: The recent cleanup at the Enterprise mine, East Fork, proved satisfactory to the owners. Out of about 18 tons of ore they realized a little over \$1800. This mine is gradually being developed and is proving fine property. The arastra will be run only a few weeks more, as the company desires to do a good deal of work running tunnels and prospecting the mine in order to determine as early as possible if it will be advisable to erect a mill. If sufficient quartz is discovered to justify them, the company will put up a stamp-mill early in the coming summer.

**FAVORABLE OUTLOOK.**—Supervisor Carter and Mr. C. C. Shattuck, from Hay Fork, speak very highly of the quartz outlook in that place for the coming year. Mr. Shattuck is taking ore from the Magdalena, which he is piling on the dump; he is crushing rock from the Cyclone, in which mine he has a four-foot ledge of fine ore. Mr. Shattuck will soon crush ore from the Good-enough, owned by Searles & Co.; as he has the only mill in the camp, he is compelled to do some custom work as an accommodation.

**SPECIMEN.**—Mr. T. J. Blakemore this week presented us with a fine, large specimen from the Daisy mine, owned by him and Clarence Hughes. It was taken from the ledge at a depth of 35 feet, shows free gold and is quite rich in sulphures. The ledge is about 14 inches and every indication points to a good and permanent ledge. The owners have an arastra ready to crush the ore they have been and are taking out.

**TWO GOOD STRIKES.**—While doing assessment work on the Poor Man mine, owned by Smith, Moor & Co., in the East Fork district, a 30-inch ledge of good-looking quartz was found; the ore will go about \$40 to the ton. Day & Moor in the Yellow Pine, which is situated on the top of the mountain above the Coleman property in the East Fork district, have struck a vein of very good ore which prospects about \$50 to the ton; the rock carries free gold and sulphures.

## Tuolumne.

**KINCAID FLAT MINE.**—Union Democrat, Dec. 29: The contract for continuing the tunnel and opening ditches of the Kincaid Flat Mining Co. was completed Wednesday. P. J. C. Reylend, the contractor, went to San Francisco Thursday, and upon his return it is expected that under his supervision mining operations will commence. The claim is now in condition to be properly worked, which it never was before. From the nature of the ground and from what it yielded in other days, there is every reason to expect it will prove profitable to the present owners. At all events, they merit success, as they have taken chances by expending quite a sum of money to demonstrate its value.

**BALD MOUNTAIN.**—The claim owned by Messrs. Mandich and Bankulich on Bald Mountain bids fair to develop into an immense bonanza. About 400

feet from the mouth of the tunnel this week a crossing was struck which prospects immensely in coarse gold, and as there are many seams running obliquely into it ahead, big things can be looked for. This is one of the finest properties in the county, and great energy combined with judgment has brought the mine deservedly to the front. The ground has to be blasted every inch, and much credit is due the gentlemen.

**BONDED.**—The mine at Cherokee owned by Messrs. John and Michael Shine, has recently been bonded to Messrs. Hamilton, Corbin & Co., who have a force of men at work sinking a winze and doing other preparatory work. The quartz recently taken out shows gold quite freely, and a new chute of large proportions has been developed. After the mine is thoroughly opened a mill will be erected in the spring. The welcome rain commenced falling Monday morning, and swelled a storm on Tuesday night. This being a mining county, water is an absolute necessity for its prosperity.

**PURCHASED.**—The other half of the Mandich mine has been purchased by Messrs. Bankulich and Mendich Bros. It is on Bald mountain below the Morris mine, and the present parties are now the sole owners. At present writing the boys have a tunnel in 400 feet; have discovered many gold-bearing crossings, and have great chances of big results—since the crossing now under operation is bearing down on the lead and throwing a heavy prospect of coarse gold, and at a distance from the mouth of the tunnel of about 400 feet. The chances for this claim throwing a hundred thousand dollars are very encouraging. The same company owns three other mines on Bald mountain all of which are good properties.

**THE JOHN ROYAL.**—Michael M. Shine of Pine Log, in partnership with R. M. Lane, is working the old John Royal lode, which years ago yielded some \$30,000. It appears that the chute making the deposits pitched oppositely from the shaft, and now the above gentlemen have drifted south, and for the first time since its early history, the conditions attending the bonanzas have appeared.

**SHIPMENTS.**—A mining company near Sonora recently shipped nine tons of sulphurets for which \$100 per ton was paid by the proprietor of a reduction works.

**HOISTING WORKS.**—The hoisting works for the Gilson & Platt mine, at Soulsbyville, are about completed and have a capacity to hoist a thousand feet.

**PROSPECTING.**—The Ice-House Hill mine, above Yankee hill, owned by Mr. L. Peterson, is prospecting well for a huge pocket.

**THE GARRETT MINE** on Bald mountain will soon have its customary force of men at work.

**TO BE WORKED.**—Tuolumne Independent, Dec. 30: Col. Caleb Dorsey of San Joaquin valley is arranging to work his mines above Columbia. That section of the county has some splendid quartz mines, but there are no means of reduction. As an evidence that capital is going that way, may be cited the mining plants of Goodwin & Co. of San Francisco; also, Thos. Matteson & Co. The Hyde mine, above Sonora, is doing well in its returns of free gold, and better in its concentrations. Several tons were lately shipped to the Selby works, and after defraying expenses of freight and reduction, a fair profit remained. This mine has a large percentage of sulphurets of various kinds, and the results thus far amply justify the erection of chlorination works. In fact a number of shipments of sulphurets have lately been made from mines in this county, and, so far as known, the results have been fully up to expectation.

**LEASED.**—R. M. Ashlock has leased some ground from Mr. Reeder, south of the Roller property, and commenced mining. A lead runs through the ground, and considerable gold has been found above the gulch and near the lead.

**TO START.**—At the Hunter mine preparations are being made to start the mill, which is now being fixed up. It will probably be all ready by the time water can be procured. The new hoisting works are on the ground, and everything necessary to put the mine in good working order. The shaft is down 40 or 50 feet, and the mine is believed to be a good one.

## NEVADA.

## Washoe District.

**HALE & NORCROSS.**—The 400 level west drift: is in fair-looking ore. The upraise on the 700 level to connect with the south drift from slope 45 feet above, the farthest boundaries of which 160 feet farther north, has reached the proper height for the connection, and drifting north has commenced from it. The connection will be made in a few days. This will give them a good circulation of air at that point. This upraise exposes a continuous body of high-grade ore as far as extended, 160 feet in length. The upraise on the south from the 700 level is 45 feet in ore, and the slope 160 feet north of that point is 49 feet in ore above the top of the southern upraise, in a ledge which cannot be less than 50 feet wide at that point.

**SAVAGE.**—On the 600 level work in the south main drift, which is making toward the ore development in the Hale and Norcross, and which it is expected to tap, is making good progress. It is now within 30 feet of the north boundary line of the Hale and Norcross. Are now extracting the usual quantity of ore from the several levels between the 400 and 900 levels. Have hoisted 707 tons of ore and have shipped 692 tons to the Mexican mill.

**CON. CAL. AND VIRGINIA.**—Ore of good quality is being stoned on the 1400 level, and on the 1435 that which is of a high grade is being obtained. There are improvements at several points in the mine. On the 1300 level the ore in the stopes is said to be widening to the northward.

**BEST AND BELCHER.**—On the 1300 level the east crosscut near the north line has been extended 36 feet; total length, 282 feet. The formation is porphyry, showing some water. A connection has been made with the upraise from the 1300 level. This connection reopens the mine where they were working prior to the fire of June 24th.

**GOULD AND CURRY.**—On the 425 level from the top of the upraise in the east crosscut an east drift has been advanced 28 feet. This drift is in clay and quartz showing value by assay.

**BELCHER.**—West crosscut No. 2 on the 400 level

is now in 29 feet. The face is in the same character of ore as last week. Work in the south drift has been resumed and advanced 20 feet. The face is nearly all in quartz, showing spots of ore, and looking very favorable.

**BALTIMORE.**—The pumps are working well and are fast reducing the water that flowed into the main shaft when the west crosscut on the 300 level cut in to the west vein. Two or three bodies of good ore have been cut.

**ANDES.**—The west drift from the north drift on the 240 level is making good progress, but as yet is in vein porphyry. On the 350 level the west drift has passed into quartz which is showing some ore.

**OCCIDENTAL.**—Are prospecting at several points of interest in the upper tunnel, and have extracted a few tons of fair-milling ore. Have extracted 100 tons of fair quality of ore from the 100 level.

**YELLOW JACKET.**—An average of 300 tons a day is being shipped to the mills on the Carson river. This ore is being taken out at points between the 1100 and 1400 levels.

**HAYWOOD.**—Some fine ore was recently struck in the drift from the bottom of the winze 200 feet below the tunnel level, making it 300 feet from the surface.

**SEGREGATED BELCHER.**—A south drift has been started from the top of 1300-level upraise, and is now in 10 feet, and is in the same material as last week.

**MEXICAN.**—The west crosscut from the north drift on the 1300 level continues in soft material much mixed with clay in the form of slips.

**CROWN POINT.**—The 500-level crosscut has been advanced 32 feet since last report. The face is in the same favorable formation as last week.

**UNION CON.**—West crosscut No. 1 on the 1300 level still continues in a formation in which porphyry is the predominant rock.

**UTAH.**—All work during the week has been confined to repairing the north drift. The east crosscut will be started at once.

**JUSTICE.**—Have about 1250 tons of fair-grade ore on the dump, which comes from the north and south drifts on the 600 level.

**ALTA.**—Are extracting ore from the 725, 825 and 1150 levels. The mill is crushing 24 tons a day.

**OPHIR.**—Good ore is being extracted from the winze down from the 1300 level.

## Bernice District.

**ORE DISCOVERY.**—Cor. Silver State, Jan. 3: Bernice had one of her best Christmas presents she has ever had presented to her in the way of the recent developments in the lowest levels of the Golden Crown and Silver Ridge mines. The former, after a heavy expenditure in running a tunnel 850 feet, with an upraise of 200 feet to make connections for the sake of ventilation and working facilities. The recent ore discovery, or rather a continuation of the ore chutes from the upper levels, now changing from a chloride to a high-grade sulphure ore, gives every evidence, as far as opened, of yielding a handsome return to its fortunate owner. The Silver Ridge mine has also been running a tunnel to open a new level and make drainage. The winzes sank on the vein from the present level encountered not only high-grade ore but a steady flow of water, making it necessary to immediately run a lower tunnel, which has now reached the vein, giving 100 feet of backs of fine ore on the ledge. Bernice for some considerable time past has been playing a rather conservative policy in doing her deadwork while silver was heavily depressed, in the hopeful anticipation that the day was not far distant when silver, that much-abused metal, will take her former relation to gold.

## Central District.

**CHLORIDERS.**—Silver State, Dec. 31: S. W. Hammond says chloriders are doing well, and there is more life in the camp than there has been for years past. Charley Wright & Co. are shipping ore from the Keystone; A. H. Ruse is extracting very rich ore from the Millionaire, and Frank Clark has leased a part of his mine, and is hauling ore to his mill so as to be ready to crush when the river rises. Norman Gilhart has been getting out rich ore from the Locomotive, and is shipping it to the Selby Smelting Works in California.

## Garfield District.

**LIVELY.**—Cor. Virginia Enterprise, Dec. 30: Garfield is the liveliest camp on the coast. Every man who comes here and wants work can get it. None are turned away. The Minnesota Copper Mining Company have begun active operations on their mine. Wesley Ballinger is prospecting the Black Prince, an extension of the Hindley. The mineral, though scarce as yet, is of very high grade. Work on the new addition to the Garfield mill is rapidly nearing completion. Superintendent G. C. Fisk of the Ida is expected here in a few days, when a large force of men will be put to work to develop the mine. The Ida is owned by Dayton people and is an extension of the famous Western. It is one of the richest mines in the district. Lew Stoner, the old-time Carson river millwright, has taken a contract to build an ore dump at the Western mine for the Garfield Company.

## Jefferson District.

**MILL RUNNING.**—Belmont Courier, Dec. 29: Charles Kanrohat's mill is running on ore from the Union mine, and it is expected that fine bullion will be produced shortly. Mr. Kanrohat owns some good mining properties in Jefferson district. Work on the Harrison mine at Jefferson is pushed with energy. The Harrison Brothers are encountering some good ore which will be worked in their mill as soon as the weather permits.

## Pamlico District.

**FREE GOLD.**—Cor. Virginia Enterprise, Dec. 30: Jason Lothrop and Billy Mattison of Dayton came in from Pamlico District, where they have been prospecting. They brought in some very fine specimens of free gold, and claim to have made a very rich strike.

## Island Mountain District.

**GOLD PLACERS.**—Cor. Reno Gazette, Dec. 29: Island Mountain Mining District was discovered and organized in 1873, and is about 70 miles north of Elko. At the time of its discovery a large number of gold placer claims were located upon Hope Gulch, which upon being worked next spring proved to be



rich but not very extensive. The water supply is small, coming principally from the snowbanks in the neighboring hills, and is generally exhausted by the first or middle of June, giving at best eight or ten weeks' mining season. For the purpose of getting greater supply of water and for a longer period of each year, a ditch was constructed in 1874 which afforded water for all the claims below, including French & Co., from early spring to the 1st of August of each year. Above the elevation of the ditch and above where the water could not be conveyed, mining was carried on in small sluices and the cradle. The Owyhee Company, E. Penrod & Son and J. L. French & Co., carried on for several years extensive operations with satisfactory results. Placer mining has continued from its discovery up to the present time, but most of the claims were worked out years ago, except those worked by J. L. French & Co. and E. Penrod & Son. Their claims will afford several years' run before they are entirely exhausted. It is claimed by those well posted that the amount of gold extracted from these mines to the present time will not fall short of \$280,000. This result may seem small, but it must be remembered that the district is situated about 7000 feet above the level of the sea, and that the working season is short. The most prominent location of quartz that is attracting local attention was made over a year ago by Messrs. French and Penrod Jr. The latter gentleman's thereafter sold out his interest to Messrs. Rogers and Brooks of Elko. The company thus organized proceeded to develop their mine under charge of Mr. French, the principal owner. They have sunk the shaft some 30 feet deep. This mine is situated north of Hope Gulch about a quarter of a mile.

#### Railroad District.

**THE MINES.**—Cor. *Reno Gazette*, Dec. 20: Railroad mining district is 25 miles south of Elko, and was discovered and organized in the year 1869 and since that period to the present it has been worked each year more or less with varied success. The chief and most important mines are found on the northwest face of Bunker Hill (whose peak reaches 9500 feet above the level of the sea). At one time a New York company had control of several of the most valuable ledges known at that time and performed a large amount of prospecting work, built a first-class smelting furnace, took out several thousand tons of ore from which they realized a handsome yield of bullion, and all seemed to be success when all at once orders came to stop work and close down. Recently this property passed into the hands of Edward Reilly. Mr. Reilly has made several runs during the past three years, which have been highly satisfactory, from ore taken from the system of ledges belonging to this property. Mr. Reilly worked his mines through a tunnel driven from the bottom of the hill from which other tunnels are excavated, reaching and opening out the series of ledges. Besides this property there are a large number of other valuable locations, and among them is the Sweepstakes, which is worked and owned by Charles A. Brosamer, who has opened up a fine piece of mining property. The ore taken from the mine is heavily charged with copper and silver, while the ores extracted from the mines belonging to Mr. Reilly are chiefly galena. In fact all the ores of this district are known as smelting ores and are easily worked, coke being used for smelting in lieu of charcoal, heretofore used. The coke is shipped from Elko. But the most noted and productive piece of mining property is known as the Tripoli, about half-way down Bunker Hill on a ridge or spur that makes down from the main mountain. This mine has been worked at times since 1870, but without much success, as the mining operations were badly directed, from the fact that the pay ore was found to exist in chambers or pockets with strata a few inches wide, widely dispersed throughout the deposit of quartz rock. However, in course of time better judgment prevailed, the mine having passed into the hands of J. Henderson of Elko, and a tunnel was excavated a few hundred feet below the discovery point from the east side which reached and penetrated the mass of quartz at the depth of 350 feet from the surface. At this point the deposit begins to assume more of a vein-like form and explorations have been continued by which several hundred tons or more have been taken out and worked by smelting process during the year 1886, yielding some \$90,000 over and above the gross expenses of mining operations. There is now on the dump a large quantity of first-class ore that it is believed will work not less than \$100 per ton on the average. This ore was taken out during the past summer, during which time there was also a large amount of dead-work in making connections and replacing timbers and generally putting the mine in first-class trim with a view of mining and working a large amount of ore during the year 1888.

#### Reveille District.

**TAILINGS.**—Belmont *Courier*, Dec. 29: The mill at Reveille is still running on tailings, and regular bullion shipments are made by William R. Norris.

#### San Antonio District.

**SILVER ORE.**—Belmont *Courier*, Dec. 29: Superintendent Asa B. Eastwood recently shipped to Eureka a load of silver ore from one of his mines in San Antonio district, Nye county. This ore was worked in the Eureka Con. furnaces, and the result proves very satisfactory. Mr. Eastwood is now at San Antonio. He expects to ship a larger load of the same class of ore shortly. The mines in the district are looking uptop, and the work of development will be pushed with vigor.

#### Spanish Belt District.

**LOOKING WELL.**—Belmont *Courier*, Dec. 29: J. E. Severance informs us that the Barcelona mine is looking splendid and that the work of development is pushed vigorously.

#### Tybo District.

**PROGRESSING.**—Belmont *Courier*, Dec. 29: Operations in the Ma Alta mine are progressing satisfactorily and good ore is encountered daily.

#### Tuscarora District.

**NAVAJO QUEEN.**—*Times Review*, Dec. 30: Are making good progress sinking shaft.

**ARGENTA.**—Sinking has been delayed some by the severe storms. A house has been erected and the shaft sunk nine feet during the past week.

**PONDERE.**—Last Monday started a south drift from shaft No. 2. The vein is small, but looks very

encouraging; occasionally a piece of ore shows free gold. North drift from main incline is looking well; the vein is well defined with good walls, and the pay streak is yielding good ore.

**NEVADA QUEEN.**—South drift, 100-foot level, has been advanced 13 feet in hard blasting rock. North drift has been extended 11 feet. Have started sinking in the winze from 200-foot level to connect with No. 3 crosscut on 350-foot level. No. 3 crosscut, 350-foot level, has been driven 20 feet, passing through several seams of spar and clay.

**NORTH BELLE ISLE.**—North drift from No. 3 crosscut north, 300-foot level, has been extended 12 feet. North drift from east crosscut No. 2 north, same level, has been extended 13 feet.

**FOUND TREASURE.**—The crosscut, 200-foot level, has been run 20 feet during the week. The rock is breaking better, and the formation is favorable for ore.

**NAVAJO.** South drift, west vein, 350-foot level, extended 8 feet. Rock breaks very hard. South drift from east crosscut No. 4, same level, has been extended ten feet.

**YOUNG AMERICA SOUTH.**—Drift north from crosscut, west ledge, has been advanced 12 feet. Good assays have been obtained, but ledge small.

**COMMONWEALTH.**—Have started drift north on the 100-foot level to follow the vein, it being three feet thick in the face.

**GRAND PRIZE.**—Stopes are looking and yielding well.

### ARIZONA.

**IN THE CATALINAS.**—Arizona *Star*, Dec. 31: Work on the Mammoth is progressing well. As soon as the panning and settler arrives the mill will start up for testing purposes, for determining character of the ore developed during the course of exploration. Permanent work has commenced on the American Flag made under the management of Thos. Armstrong. The property has been lying idle for the past two years. A fine body of ore was struck on the surface when opening the air shaft last week. The ore is silver-bearing. The main workings are down 180 feet. There are levels at 75 and 150 feet. There are seven mines in this group. Mr. Ezekiel has just completed a contract in doing the assessment work on the Oracle group. Some good gold ore was struck on the Hondoo mine, and the other claims look well. Both of these groups are the property of the Richardson Con. M. Co. of New York. They have been recently bonded to an English syndicate.

**COPPER.**—Copper mines will now be in demand. Globe District can show more good copper mines and prospects than any other district in the Southwest, and the fact should be brought to the attention of mining men and capitalists in the East.

**ACTIVITY.**—Like Hinzman returned to Globe a few days ago, after an absence of several months, during which time he visited the principal towns in Southern Arizona. He reports greater activity in mining at Tombstone and Bisbee than those camps have experienced at any time in the past several years.

### COLORADO.

**SEVEN-THIRTY.**—Georgetown *Courier*, Dec. 29: The great mineral-bearing veins included under the name of the Seven-Thirty are located on Brown and Sherman mountains, and are covered by over 40 U. S. patents, embracing a surface area of nearly 200 acres, and giving a total length along the veins of over 11 miles. The veins are from three to six feet in width, encased with walls of granite, gneiss and pegmatite. Numerous veins of porphyry and traceable extend across the country sometimes at nearly right angles with the mineral-bearing veins. In every instance these dykes have been found to be bisected by the mineral veins, showing them to be of prior origin. Porphyry also exists in the mineral veins, but without noticeable regularity. In some of the veins this rock, through kaolinization, seems to have absorbed sulphide of silver, and frequently carries from two to three per cent of that metal. Before any records of the ore returns from these veins were kept, the production was very large, and now that the workings have reached in places a depth of 1000 feet, ore is continuously extracted worth \$500 to \$1000 a ton. A fathom of ground over the tunnel level was pointed out to the writer which had produced \$500, the total cost of extraction being \$50. Five thousand dollars was taken out of a stope 100 feet by an old-time miner still in this camp. A stope 50 feet long produced at the rate of \$1000 per foot of \$50,000 for 5000 feet. An adjoining block of ground of equal size and richness is held in reserve for a rainy day. The present owner has the record of three-quarters of a million filed away in mill certificates of ore sold, and the entire production is estimated to be over a million dollars. On the 80-foot level may be seen a continuous stope on ore 1500 feet in length. The level produced \$100,000 in one year and is still producing large quantities of ore from the ends. The two levels below this again show almost continuous stoping for 1300 and 1400 feet in length, and are being driven on ore both ways. A block of this ground 300 feet in length is also held in reserve.

**BULLION.**—Georgetown *Courier*, Dec. 29: During the past year the Boston & Colorado Smelting Company made the following shipments: Gold, \$748,980; silver, \$2,634,305; copper, \$384,400; total, \$3,767,685.

### DAKOTA.

**FLOAT.**—Black Hills *Pioneer*, Dec. 29: James Brodie, who is working on the property of the El Dorado Company, reports the mine looking well. From Oscar Waller, in from Carbonate last night, it is learned that the force working on the Midsummer claim is constantly encountering pockets of chloride ore that assays over 200 ounces silver per ton. Confidence is expressed that these lead to a solid formation which will be discovered before the lapse of any great period of time. A Rapid City party is recently in receipt of a letter from Hon. M. H. Day, now in New York, stating that he is about organizing a company to take hold of his Spruce gulch property and proceed with its development. The locations are generally regarded here as among the most promising in the district, and

should a strong syndicate make the purchase the result will in all probability be the speedy adding of another name to the list of productive Black Hills mines.

### IDAHO.

**ERA NEWS.**—*Inter-Idaho*, Dec. 30: Frank Boyle, from Era, says that notwithstanding the shut-down of the Bannock company, Era is lively and prosperous. The approaching sale of the Horn silver mine will probably result in a greater advantage to the camp. Every one expects operations to be resumed in the spring. Other properties are being steadily developed. The St. Louis is showing up fine. All the Lava creek mines are being worked. The Hub is raising now and preparing to put up hoisting works in the spring. Some very rich ore has been struck lately, both in the upraise and in the face of the drift. The Hub continues its shipments to Nicholia, the last being some four or five tons. The value of the ore is shown by the fact that it pays to ship it so far overland by wagons. The charges on it are \$20 a ton to the freighters and \$15 a ton working charges.

**THE ELKHORN.**—Ketchum *Keystone*, Dec. 31: At a recent meeting in Helena, Montana, of all the owners in the Elkhorn mine of this place, a proposition was considered to spend a few thousand dollars in development work on that once lucrative property, and resulted in letting a contract to Hank Richardson and Griff Thomas, two well-known and experienced miners of this place, to extend the Keystone tunnel—now in about 600 feet—to a distance of at least 600 feet further, in a direction most practicable to intercept the Elkhorn ledge.

**NOONDAY MINE.**—John Ervin has secured a lease of the Noonday mine for 12 months. The Noonday was at one time a fine producer, and paid its owners handsome dividends, but for the last two or three years work has been entirely suspended.

**THE SILVER CROWN.**—The parties having a bond and lease on the Silver Crown mine, situated on the East Fork of Wood river, have uncovered an eight-inch vein of rich ore near the dividing line between it and the Venus mine.

**MINING NOTES.**—It is reported that the Minnie Moore and Queen of the Hills Mining Companies will resume operations again after January 1st, upon the basis of reduced freight rates, and miners' wages at \$3 per day.

### MONTANA.

**RICH PROPERTIES.**—Butte *Inter-Mountain*, Dec. 29: A gentleman from Anaconda says that new developments in the Blue-Eyed Nellie district continue to attract renewed attention to that section. The Homestake, which is some four or five hundred yards up the hill from the Nellie, is now shipping a good deal of high-grade ore, and the same is true of one or two claims situated in the gulch on the other side of the hill. The Homestake ore body was uncovered while the men were grading for building a cabin. The ore is similar to that in the Nellie, and there seems to be plenty of it. Other claims in the vicinity are showing up well.

### NEW MEXICO.

**IMPORTANT MINE SALE.**—Kingston *Shift*, Dec. 24: We learn that the Savage, joining the Superior and Bullion on the east, has been sold for \$50,000, and the Southwest, situated about two miles southwest of town, has been sold for \$25,000. John Fraser owns a half interest. The Savage has been a regular ore producer, while several shipments have been made from the Southwest, and the surface indications and workings are very favorable for the making a valuable mine, and we are inclined to think that the purchasers have made a good investment. John Fraser is an old-time here, who has stuck to the camp and is being rewarded. He has other valuable property here.

**SILVER WEDGE.**—Col. B. F. Pegues during his recent visit East organized a company to work the Silver Wedge, a mining claim lying on the north side of the Bonanza Hill, and adjoining the Caledonia and Comstock, both of which have a reputation known all over the mining world. Besides the Silver Wedge, Mr. Pegues has bonded from Col. Lockhart and R. H. Hopper the Carbonate mine, lying in the "Belt" immediately south of the Illinois and Brush Heap, well-known producing mines, and adjoining the Midnight and Hamburg, from both of which rich ore has been taken, but which, at present, are "tied up." The Carbonate has been in the same fix, and recently came into the possession of the above-named gentlemen. We understand that Col. P. has gone East to interest his friends in some of the property of which he has control.

### UTAH.

**REVIEW.**—Salt Lake *Tribune*, Dec. 23: The Ontario product for the week was, in bullion, 23,557 fine ounces; from ore sales, \$12,876.44, an approximate total of \$36,433.44. The output of the Daly for the week was \$11,458.53 fine ounces of silver bullion; no ore sales. Fine bar receipts in this city for the week were to the value of \$44,411.28; base bullion, \$10,700; gold bar, \$4000. The product of the Hanauer smelter for the week was \$19,500 in bullion; of the Germania, \$13,518.89. The Horn Silver is doing nothing as far as can be ascertained. Ore receipts in this city for the week were to the value of \$1700 by Wells, Fargo & Co.; \$9250 by McCormick & Co., and \$7441.03 by T. R. Jones & Co.

### WASHINGTON.

**COLVILLE MINES.**—Colville *Miner*, Dec. 29: The Mutual Smelting & Mining Co.'s works, just three-fourths of a mile east of Colville, was visited by a Miner representative last Monday morning, who found the smelter in full operation and melting out bullion. Rob Roy is still grinding away on the Daisy. He has met nothing to hinder his rapid progress in the tunnel and has been following good ore for three weeks. It is reported that the Eagle mine at Chewela has six men employed on the property, all working on ore, which they are piling on the dump, preparatory to shipment for reduction.

### Mining Share Market.

The following mining companies have cash on hand according to the statements placed on file yesterday:

Alta, \$13,080.41; Alpha, \$6414.08; Andes, \$9295; Bulwer, \$10,870.87; Bodis, \$40,606.99; Bullion, \$31,690.39; Belcher, \$18,352.52; Crocker, \$3701.07; Con. Cal. and Virginia, \$75,250.26 in cash and \$121,432.40 in unsold bullion, with more shipments to arrive; Challenge, \$15,170.88; Consolidated Imperial, \$9586.93; Dudley, \$1122.81; Exchequer, \$11,816.36; Eureka, \$61,914.30; Fraud Treasure, \$1935.77; Gould & Curry, \$29,166.92; Independence, \$5849.40; Julia, \$1452.23; Justice, \$10,151.19; Kentuck, \$946.37; Lady Washington, \$11,014.80; Mexican, \$4035.28; Mono, \$16,747.50; North Belle Isle is overdrawn \$1758.91, but has gross bullion valued at \$84,428.95 on hand, and bills receivable amounting to \$25,000; Ophir, \$17,147.07; Orleans, \$1297.79; Pondera, \$1098.04; Peerless, \$19,249.06; Peer, \$3658.92; Standard, \$89,950.20; Syndicate, \$10,776.39; Weldon, \$6242.16.

The following companies show an indebtedness: Best and Belcher, \$5798.59; Belle Isle, \$542.46; Commonwealth, \$33,561.43; Chollar, \$32,555.53; Crown Point, \$22,376.74; Hale and Norcross, \$20,842.76; Locomotive, \$6317.89; Mount Cory, \$46,594.90; Navajo, \$19,748.21; Nevada Queen, \$45,803; Occidental, \$3754.76; Potosi, \$41,005.09; Seg. Belcher, \$9707.35; Savage, \$17,350.55; Sierra Nevada, \$3063.66; Utah, \$1188.57.

Mining stocks do not seem to get much chance to advance any. There is a little spurt and then down they go again. On the Comstock the work of development of mines and extraction of ore is being pushed vigorously in every mine of promise along the lode, from its most northern to its most southern boundaries. So far as the interests of the workmen are concerned, this fact alone is sufficient to inspire a happy feeling. There was a time, and it is not long since, when mining managements were eager to seize upon any provocation, however slight, to make a draft in the mines and discharge men from work. Now, the conditions are entirely reversed. The elements and every contrary thing are battled against and almost invariably surmounted, and work is pushed forward over every obstacle.

### Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Hanauer, Dec 25, \$8450; Germania, 28, \$3927; Hanauer, 29, \$2430; Germania, 29, \$5814; Hanauer, 30, \$5000; Germania, 30, \$1908; Hanauer, 31, \$2530; Germania, 31, \$1806; Hanauer, Jan 1, \$8300; Germania, 1, \$1854; Nevada Queen, 1, \$20,000. The receipts of the metals in Salt Lake City for the week ending December 28th, inclusive, amounted in value to \$110,501.20, of which \$92,110.17 was in bullion, and \$18,391.03 was in ore. For the previous week the receipts were \$82,578.85 in bullion and \$27,103.13 in ore, a total of \$109,681.98.

**LANE LECTURES.**—The sixth course of popular lectures at Cooper Medical College, corner Sacramento and Webster streets in this city, will be delivered this winter, the first one occurring Jan. 6th. No ticket of admission is required. The program of lectures is as follows: Friday, Jan. 6, 1888, Professor L. C. Lane, "Coffee." Friday, Jan. 20, 1888, Professor Clinton Cushing, "Physiocal Excellence." Friday, Feb. 3, 1888, Professor A. Barkan, "Spectacles." Friday, Feb. 17, 1888, Professor J. H. Wythe, "The Microscope as a Detective." Friday, March 2, 1888, Professor Chas. H. Steele, "The Bath." Friday, March 16, 1888, Professor C. N. Ellinwood, "The Stomach." Friday, April 6, 1888, Professor J. M. Hirschfelder, "Electricity in Medicine." Friday, April 20, 1888, Doctor W. S. Whitwell, "Insanity." Friday, May 4, 1888, Professor Henry Gibbons, Jr., "The Utility of Pain." Friday, May 15, 1888, Professor W. D. Johnston, "Lower Forms of Life."

### Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

### Our Agents.

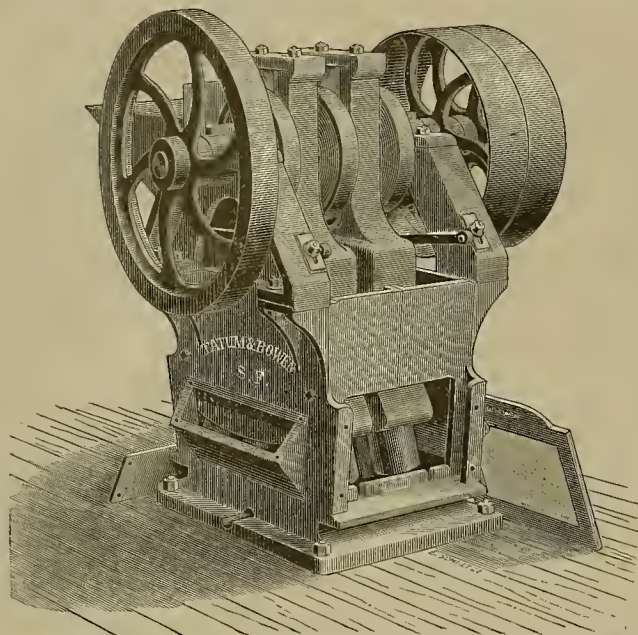
OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

F. B. LOGAN—Santa Clara Co.  
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A CHRISTMAS dividend of \$6000 (10 cents a share) was distributed among the stockholders of the Bald Mountain Extension Company of Sierra county, most of whom are Downieville people. Thousands of dollars have been paid by this valuable property during the year.



## THE DOUBLE "ECONOMIC" STAMP MILL



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

## AN AUTOMATIC ORE FEEDER

Goes with each Mill. We also have a suitable

## Rock Breaker.

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

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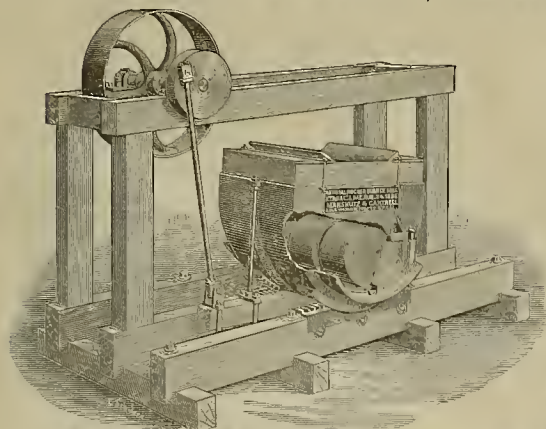
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## NATIONAL ROCKER QUARTZ MILL.

KENDALL'S PATENT, AUGUST 24, 1886.

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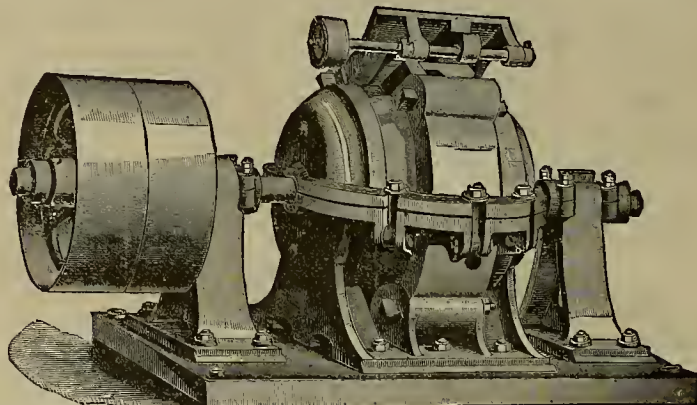
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## THE FRISBEE-LUCOP MILL, A CENTRIFUGAL ROLLER MILL



For Reducing Ores, Quartz, Phosphate and Cement Rock, and other  
Mineral Substances to any required degree of fineness  
most rapidly and economically.

All substances when ground leave the mill in a finished state—no regrinding being necessary. Automatic  
Feed. Wearing parts of Steel and Forged Iron.

### BLAST AND SCREEN MILLS.

Sizes.....	24 inch.	30 inch.
Weight.....	5500 lbs.	3800 lbs.
Speed.....	360 rev.	500 rev.
Horse Power required.....	15 to 18 H. P.	6 to 9 H. P.
Space required.....	6 1/2 x 4 x 4 feet.	6 x 3 1/2 x 4 feet.
Size driving pulleys.....	28" D. x 8" face.	20" D. x 7" face.

Capacity, 24-inch mill, 1 to 2 tons quartz per hour, to 60 mesh; 3 tons cement or phosphate rock per hour, to 50 mesh. Wearing parts require no fitting, easily and cheaply replaced when necessary. Cost of repairs differs with circumstances. Less than 1c per ton for phosphate and cement rock. Maximum, 10c. per ton for hardest quartz. For further particulars and prices address

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145 BROADWAY, NEW YORK.

And 461 Howard St., San Francisco, where a Mill can be seen in operation and ores  
will be reduced at reasonable rates.

## H. P. GREGORY & CO.

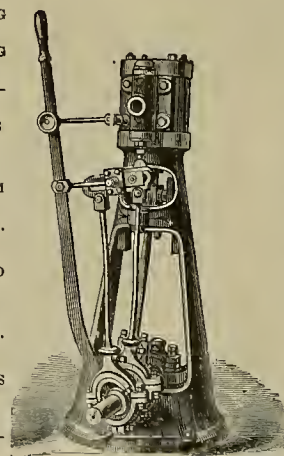
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MACHINERY for SYSTEMATIC MILLING, SMELTING, and CONCENTRATION of ORES.

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Ores worked by any Process.

Ores Sampled.

Assaying in all its Branches.

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Working Tests (practical) Made.

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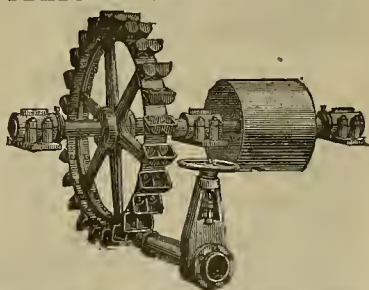
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THIS WAS ONE OF THE FOUR WHEELS TESTED  
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gave 90 2 per cent., distancing all competitors. Send for  
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Experimental machinery and all kinds of metal, tin,  
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These Wheels are designed for all purposes where limited quantities of water and  
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any other wheel made. Being placed on horizontal shaft, the power is transmitted  
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Estimates furnished on application for wheels specially built and adapted in  
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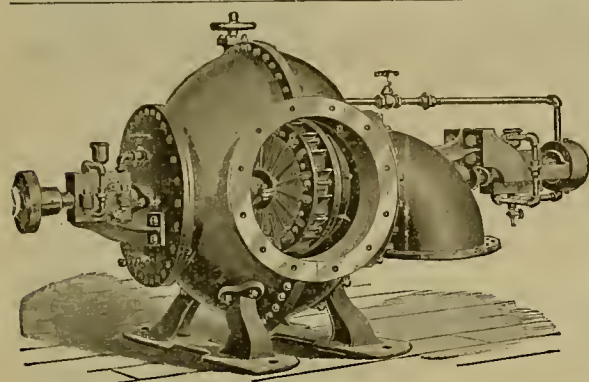
Further information can be obtained of this form of construction, as well as the  
ordinary Vertical Turbines for Wooden Penstocks and in Iron Globe Cases, free of cost,  
by applying to the manufacturers.

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## PNEUMATIC PULVERIZER.

The principle of pulverization consists in the employment of two

POWERFUL OPPOSING CURRENTS

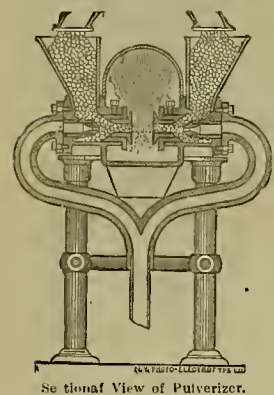
Of dry super-heated steam, so arranged that they continuously charge themselves with crushed or granulated material, and by  
the great force and velocity of the steam currents the minerals are dashed against each other with such power of concus-  
sion as to cause the hardest ores to be pulverized to any degree of fineness desired. The high temperature of the super-  
heated steam currents employed, through which every minute particle of ore must pass, causes them to become very  
hot and dry, which produces a beneficial effect upon Sulphurets and ores containing rusty Gold. The light weight  
and simplicity of construction of the Pulverizer, its extremely small and inexpensive wearing parts, are the WONDER  
and SURPRISE of all who witness its operation. The Company is prepared to furnish complete plants for pulverizing

10 TO 200 TONS PER DAY,

Including a Sectional Steam Boiler supplying all the power required.

**PNEUMATIC PULVERIZER COMPANY,**  
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Write for Particulars.



Sectional View of Pulverizer.

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One door from Bank of Cal.



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ARCHITECTURAL IRON WORK.

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CHEMICAL LABORATORY,  
BULLION ROOMS and ORE FLOORS,

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COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed  
of in the Open Market to the Highest Bidder.



## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING DECEMBER 27, 1887.

375,471.—CHAIR-BACK AND HEAD-REST—F. Binder, Alameda, Cal.

375,344.—SECURING SASHES IN WINDOW-FRAMES—S. R. Deacon, Los Angeles, Cal.

375,480.—CABLE RAILROAD CHANNEL—W. Dunham, Igo, Cal.

375,485.—GRAIN SEPARATOR—J. Grider, Stockton, Cal.

375,497.—APPARATUS FOR DISTILLING WOOD—G. Hunziker, Cloverdale, Cal.

375,496.—MUSIC CHART—C. S. Mason, Orange, Cal.

375,565.—TWO-WHEELED VEHICLE—N. S. Parker, Salem, Ogn.

375,509.—WAD-SORTER—P. Selby, Oakland, Cal.

NOTE.—Copies of U. S. and Foreign Patents furnished by DEWEY &amp; CO., in the shortest time possible (by mail or telegraphic office). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey &amp; Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CHAIR-BACK AND HEAD-REST.—Frederick Binder, Alameda. No. 375,471. Dated Dec. 27, 1887. This novel chair-back and head-rest consists of a board of sufficient length, having devices at the lower end by which it may be adjustably connected with any chair, the upper end extending to a sufficient height, and having a cushioned pad or rest for the head.

CABLE-RAILWAY CHANNEL.—Warren Dunham, Igo, Shasta Co. No. 375,480. Dated Dec. 27, 1887. The invention is in the improvement of the channel or tube in which the cable of cable-railways travels. The invention consists of hinged flaps or lids covering the grip-slot of the channel-way and in their peculiar construction and arrangement. The objects of the invention are to exclude snow, dirt, and other debris from the channel. The flaps or lids are raised as the grip approaches, so as to permit it to pass as it is carried along by the cable, and they are let down after it has passed, so that they do not impede the general operation of the road.

WAD-SORTING MACHINE.—Prentiss Selby, Oakland. No. 375,509. Dated Dec. 27, 1887. The invention is a device for sorting wads which are used in loading cartridges, in order that the varying thicknesses of wads may be separated from each other, and each grade of wads may be used together, so that the loads in the shells may have an absolute uniformity in every respect. It consists of a vertical receiver into which the wads are placed, a segmental swinging-shoe moving beneath the receiver, together with a rotating table having radially extending arms with clamps or holders at their outer ends, beneath which the wads are deposited by the moving shoe, and a cam which acts upon these rods so as to deposit the wads into the proper receptacles, which are arranged around a periphery of the table.

GRAIN SEPARATOR.—John Grider, Stockton, assignor of one-half to Geo. Chestnutwood and Thos. N. Moore. No. 375,486. Dated Dec. 27, 1887. This is a new and useful improvement in grain separators, the object of which is to prevent the riddle or shoe from becoming clogged with the weeds and short straws discharged upon it by the grain belt, and at the same time to more effectually clean the grain, so that but a small proportion is returned to the cylinder, whereby the elevator and conveyor are never choked. The racks not only have a forward and backward movement, but a lifting movement as well, which tosses up the material and thus gives the fan-blust such power and direction that the separator is more complete and most of the grain is saved at the forward end.

## San Francisco Metal Market.

WHOLESALE.		THURSDAY, Jan. 5, 1888.	
ANTIMONY—French Star	91 @	26 @	30
BORAX—San Bernardino	50 @	26 @	30
Armstrong	6 @	26 @	30
COPPER—			
Bolt	26 @	30	
Sheeting	26 @	30	
Ingot	26 @	30	
Fire Box Sheets	26 @	30	
Iron—Glenbrook ton.	— @	30	00
Eglington ton.	— @	30	00
American Soft, No. 1, ton.	— @	30	00
Oregon Pig, ton.	21 @	23	00
Clay Lane White.	22 @	50	
Shotts, No. 1.	31 @		
LEAD—Pig.	50 @	50	50
Bar	50 @	50	50
Sheet	50 @	50	50
Shot, discount 10% on 500 bag	Drop, 10 bag.	2 @	20
Back, 10 bag.	2 @	20	
Ohilled, do.	2 @	20	
Steel—English, B.	16 @	25	
Black Diamond, ordinary sizes.	91 @		
Flow	44 @	5	
Machinery	44 @		
Naylor & Co.	10 @		
Tristram & Co.	5 @	75	60
Tharal	6 @	75	75
Q. O. SILVER—By the disk.	— @	50	00
Flasks, new	1 @	50	
Flasks, old	86 @		

## Foundry Notes.

During the past year the foundries have been doing a better business than for some years. The rapid settlement of the State, the inauguration of new enterprises and development of old ones, have been the cause of numerous orders. The foundries have melted over 13,000 tons of pig iron during the year, and there has been an immense consumption of wrought iron also. The largest single piece of work started here during the year was the construction of the Government cruiser Charleston, at the Union Iron Works. At the present time, the hull is finished up to the protective deck, while above this to the main deck only the frames and deck beams are as yet in position, leaving all this upper portion to be plated. The steel stern-post recently cast at the rolling-mill, and weighing nearly five tons, is now being put through the machine, prior to its being covered with the plating.

The engines are well under way in the course of construction, many of the working parts being already finished, while the larger and stationary parts are rapidly becoming so. Many of the smaller engines to be used for various purposes in different parts of the vessel are already completed. As soon as this vessel is completed, another cruiser will be laid down on the same stocks.

The Pacific Rolling-Mills are very busy in building cable railroads, turning out miscellaneous work and furnishing material for the Government cruiser. In another column we give some details of tests of the steel made at these mills.

The new building for the shops of the Fulton Iron Works, to replace those destroyed recently by fire, is nearly completed. New tools have been purchased, and before long the works will be in better shape than ever.

The Risdon Iron Works, like other city foundries, have plenty of work on hand.

Mr. A. P. Brayton of the Pacific Iron Works is still in the East.

Patrick Noble, superintendent of the Pacific Rolling-Mills, has returned from Los Angeles, for which city the mills are doing a large amount of cable-railroad work.

The Golden State and Miners' Iron Works have in hand one of the largest set of hoisting works ever made on the coast. The machinery is intended for a coal mine in Washington Territory.

## Split vs. Solid Pulleys.

We take from *Power and Transmission* the following concerning the Dodge patent separable split pulleys, for which John Simonds of this city is Pacific Coast agent:

In a well-known machine-shop, not long ago, a stop was made to overhaul the main line shaft, which needed straightening and lining up. A strong force of men was set at work and a scaffolding erected underneath the shaft in order to permit the men to reach their work. About one-fourth of the pulleys on the shaft were wood-split pulleys of the Dodge patent, and in less than half an hour they were off of the shaft and lying down on the floor. The remainder of the pulleys were of the ordinary cast-iron pattern, and the rest of the day was occupied in getting those cast-iron pulleys off of the shaft in order to take it down and straighten it.

The next day was spent in putting those iron pulleys back again, and after they were in their places and the shaft put up once more the split pulleys were restored to their positions on the shaft in as short a time as it had taken to remove them.

The remark was made at the time that if all the pulleys on the shaft had been wood-split pulleys, the entire job could have been completed in one day, and the delay of the second day's stoppage avoided. The greater probability is that if the shaft had not been obliged to carry the weight of the heavy cast-iron pulleys it would not have needed straightening at all and the stoppage and straightening might have been avoided altogether.

## New York Metal Market.

Telegraphic advices dated Jan. 4th give the following New York prices:

BAR SILVER—96 3/4 per oz.  
BORAX—\$4.00/cwt.  
COPPER—LARS—\$17.37@17.25.  
IRON—No. 1, \$22.00.  
LEAD—\$5.00/cwt.  
TIN—\$36.50.

The following is the latest by mail from the "New York Metal Exchange Market Report":  
COPPER—Quiet, spot closing at \$17.55@17.70. Transferable Notes (Lake) issued at \$17.25@17.50.  
LEAD—Steady at \$5.00@5.15 spot. Transferable Notes issued at \$5.10.  
IRON—Dull at \$36.37 1/2. Transferable notes issued at \$36.45.

MAKERS' PRICES—At tidewater. 100-ton lots of listed irons (when brand is specified) range nominally about as follows: Lehigh, Grade No. 1, \$20.50@21.00; No. 2, \$19.50@20.00; Grey Forge, \$17.00@17.50; Hudson River, Grade No. 1, \$20.00@21.00; No. 2, \$19.00@20.00; Grey Forge, \$17.50@19.00; Southern, Grade No. 1, \$20.00@21.00; No. 2, \$18.50@19.00; Grey Forge, \$17.00@17.50.

Price generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, \$38.00@37.25; Billiton Tin, \$37.00@37.50; Banca Tin, \$37.00@37.50; Baltimore Copper, \$14.75@15.25; Orford Copper, \$15.25@15.50; P. S. C. Copper, \$15.00@14.00; Foreign Lead, \$5.40@5.50; Foreign Spelter, \$6.10@6.50; Antimony, \$14.00@15.00.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

COMPANY.	LOCATION.	No. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Alta S. M. Co.	California.	36.	50. Nov 23. Jan 30.	23. W. H. Watson.	309 Montgomery St.
Blue Lakes Water Co.	California.	1.	1.00. Dec 13. Jan 20.	14. R. N. Van Brunt.	318 Pine St.
Belle Isle M. Co.	Nebraska.	11.	15. Dec 14. Jan 17.	7. J. W. Pew.	310 Pine St.
Best & Belcher M. Co.	Nebraska.	39.	50. Jan 4. Feb 9.	29. L. Osborn.	339 Montgomery St.
Crown Point G. & S. M. Co.	Nebraska.	48.	50. Jan 4. Feb 9.	29. J. Newlands.	329 Pine St.
Central California Oil Co.	California.	6.	1.00. Jan 17. Dec 27.	24. J. G. Hale.	314 California St.
Chollar M. Co.	Nebraska.	24.	50. Dec 5. Jan 10.	31. C. E. Elliott.	319 Montgomery St.
Commonwealth Con M. Co.	Nebraska.	6.	50. Dec 29. Feb 6.	28. H. Deas.	309 Montgomery St.
Champion M. Co.	Nebraska.	28.	10. Dec 12. Jan 14.	2. T. Wetzel.	522 Montgomery St.
Foundry & Machine Co.	Nebraska.	1.	15. Dec 14. Jan 17.	30. J. Stadfeld Jr.	418 California St.
Felice M. Co.	Arizona.	20.	Nov 11. Dec 17.	3. T. F. Holling.	324 Montgomery St.
Fisher M. Co.	Arizona.	1.	20. Nov 11. Dec 17.	3. T. F. Holling.	324 Montgomery St.
Gray Eagle M. Co.	California.	4.	01. Nov 17. Dec 22.	12. T. Wetzel.	522 Montgomery St.
Heath M. Co.	Idaho.	2.	05. Nov 4. Dec 10.	30. W. L. Oliver.	328 Montgomery St.
Island M. Co.	Nebraska.	15.	Dec 21. Jan 24.	11. C. E. Higgins.	320 Montgomery St.
Kosuta M. Co.	Nebraska.	9.	10. Nov 25. Jan 5.	5. F. B. C. K. Sturtevant.	309 Montgomery St.
Live Oak Drift M. Co.	California.	7.	05. Dec 12. Jan 16.	4. T. Wetzel.	522 Montgomery St.
Manhattan M. Co.	Nebraska.	7.	1.01. Dec 9. Jan 12.	31. J. Crockett.	327 Pine St.
Mayflower M. Co.	California.	39.	25. Nov 23. Dec 23.	18. J. Morio.	328 Montgomery St.
Morgan M. Co.	Nebraska.	1.	15. Nov 24. Dec 31.	24. S. Noal.	320 Montgomery St.
Mon. & G. M. Co.	California.	25.	50. Dec 20. Jan 24.	28. G. W. Sessions.	309 Montgomery St.
North Banner Con M. Co.	California.	20.	01. Nov 18. Dec 20.	7. T. J. Mitchell.	Grass Valley
Nevada Queen M. Co.	Nebraska.	3.	50. Dec 16. Jan 24.	16. H. Deas.	309 Montgomery St.
Ochenta M. Co.	California.	1.	15. Nov 23. Dec 23.	8. A. K. Durbow.	39 Montgomery St.
Potosi M. Co.	Nebraska.	29.	50. Nov 30. Jan 5.	26. C. E. Elliott.	309 Montgomery St.
Sierra Nevada M. Co.	Nebraska.	31.	25. Dec 7. Jan 11.	30. E. L. Parker.	309 Montgomery St.
Utah Con M. Co.	Nebraska.	3.	25. Dec 13. Jan 17.	3. A. H. Fish.	309 Montgomery St.

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE.
Alaska M. & M. Co.	Alaska.	T. J. Hay	420 Montgomery St.	Annual.	Jan 12
Black Diamond Coal Co.	Nebraska.	J. H. Robinson.	305 Sansone St.	Annual.	Jan 14
Bullion M. Co.	Nebraska.	R. R. Grayson.	527 Pine St.	Annual.	Jan 12
California Iron & Steel Co.	California.	P. Bonaccia.	333 California St.	Special.	Jan 13
Chollar M. Co.	Nebraska.	W. Watson.	309 Montgomery St.	Annual.	Jan 16
Genesee M. Co.	Nebraska.	E. T. Stone.	306 Pine St.	Special.	Jan 10
Iowa M. Co.	Nebraska.	C. B. Higgins.	408 California St.	Annual.	Jan 10
Silver King M. Co.	Arizona.	J. Nash.	328 Montgomery St.	Annual.	Jan 10
Sierra Nevada M. Co.	California.	H. P. H. H. H.	328 Montgomery St.	Annual.	Jan 10
S. F. Copper Co.	Nebraska.	H. P. H. H. H.	328 Montgomery St.	Annual.	Jan 10
Sierra Nevada M. Co.	Nebraska.	E. L. Parker.	309 Montgomery St.	Annual.	Jan 18
Superior M. & M. Co.	California.	J. M. Buffington.	309 California St.	Annual.	Jan 10
Sulphur Bank M. Co.	California.	T. W. Winburn.	306 California St.	Annual.	Jan 16
William Penn M. Co.	Nebraska.	J. Sevier.	309 Montgomery St.	Annual.	Feb 7

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con. California Va M. Co.	California.	A. W. Havens.	309 Montgomery St.	50.	Jan 10
Derbec Blue Gravel M. Co.	California.	T. Wetzel.	522 Montgomery St.	50.	May 19
Eureka Con M. Co.	Nebraska.	H. R. P. Hutton.	306 Pine St.	25.	Jan 9
Paradise Valley M. Co.	Nebraska.	W. Letts Oliver.	328 Montgomery St.	10.	Apr 15
Russell Reduction & M. Co.	California.	J. Morio.	328 Montgomery St.	05.	Sept 17
Silver King M. Co.	Arizona.	J. Nash.	328 Montgomery St.	25.	July 15
San Francisco Copper M. Co.	California.	E. Berier.	320 Sansone St.	40.	Sept 19
Standard Con M. Co.	California.	J. W. Pew.	310 Pine St.	05.	Jan 12

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Dec. 15.	WEEK ENDING Dec. 22.	WEEK ENDING Dec. 29.	WEEK ENDING Jan. 5.
Alpha.	2.00	2.50	1.25	2.60
Alta.	2.40	2.75	1.55	2.55
Andes.	1.60	1.75	1.35	1.65
Argentina.	—	20.	—	15.
Belcher.	9.75	12.00	11.	5.75
Brophy.	8.00	8.75	7.10	8.00
Best & Belcher.	2.25	2.50	1.75	2.30
Bullion.	1.00	1.40	1.00	1.30
Baltimore.	1.00	1.40	1.00	1.30
Belle Isle.	2.50	3.20	2.30	3.10
Bodie Con.	2.50	3.20	2.30	3.10
Benton.	—	—	3.00	—
Bodie Tunnel.	—	—	95.	85.
Bulwer.	23.	20.	21.	18.
Con. Va. & Cal.	23.	20.	21.	18.
Challenge.	2.90	3.10	2.35	3.00
Champion.	6.25	8.00	6.25	6.00
Chollar.	10.	11.	9.50	8.10
Con. Imperial.	3.25	3.25	2.90	3.10
Caledonia.	65.	75.	50.	60.
Con. Pacific.	—	—	35.	45.
Crown Point.	98.	107.	78.	101.
Crocker.	85.	110.	85.	105.
Central.	—	—	25.	—
Dudley.	20.	30.	—	25.
East B. & B.	—	—	—	50.
Eureka Con.	6.25	—	—	5.50
Exchequer.	6.75	7.00	6.00	6.50
Grand Prize.	1.00	1.25	1.20	1.30
Gould & Curry.	6.00	7.00	4.00	6.00
Hale & Norcross.	8.50	10.00	8.00	10.00
Holmes.	—	—	1.00	—
Independence.	—	—	—	—
Iowa.	—	—	—	—
Julia.	60.	65.	50.	35.
Justice.	1.40	1.40	90.	1.35
Kentuck.	2.00	2.25	35.	45.
Lady Wash.	—	—	35.	45.
Martin White.	—	—	—	—
Mono.	2.00	2.20	2.00	1.50
Mexican.	6.00	7.00	4.00	6.00
Mt. Diablo.	—	—	—	—
Northern Belle.	1.00	1.05	90.	1.00
Nevado.	7 1/2	8 1/2	7.50	8.00
North Belle Isle.	7 1/2	8 1/2	7.50	8.00
Niagara.	—	—	2.80	2.25
Nov. Queen.	2.70	3.40	2.60	2.30
North B. & C.	1.70	1.75	1.10	1.65
Occidental.	11.	12.00	10.	9.
Ophir.	11.	12.00	10.	9.
Overman.	2.90	3.20	1.35	3.00
Potosi.	6.75	7.00	6.00	6.75
Perrine.	40.	40.	150.	150.
Peer.	65.	75.	65.	70.
P. Sheridan.	—	—	—	—
Silver Star.	8.00	9.25	7.00	8.00
Savage.	—	—	—	—
Seg. Belcher.	5 1/2	7 1/2	4.00	6.00
Sierra Nevada.	5 1/2	7 1/2	4.00	6.00
Silver Hill.	50.	70.	40.	60.
Silver King.	55.	75.	35.	45.
Scorpion.	55.	75.	35.	45.
Syndicate.	—	—	—	—
Union Con.	4.10	6.00	4.40	5.50
Utah.	2.10	2.45	1.50	2.25
Yellow Jacket.	65.	80.	50.	60.

## Sales at San Francisco Stock Exchange.

THURSDAY Jan. 5, 1887.		250 Hale & Nor.		121	
200 Alta.	2.10	320 Justice.		100	
150 Andes.	1.12	150 Lady Wash.		40c	
150 Alpha.	1.40	220 Mexican.		4.95	
350 B. & Belcher.	6.40	120 Mono.		1.55	
100 Belcher.	6.75	300 N. Belle Is.		7.75	
150 Baltimore.	85.	50 Nev. Queen.		2.30	
200 Bulwer.	80.	50 Nevada.		8.50	
250 Bullion.	1.90	20 Ophir.		1.50	
100 Bodie Con.	2.70	20 Overman.		1.75	
150 Belle Isle.	45c	410 Occidental.		95c	
125 Challenge.	2.20	10 Potosi.		61	
150 Chollar.	7.80	300 Peerless.		1.45	
100 Con Va. & Cal.	21.	10 Peer.		70c	
725 Crown Point.	7.75	220 Savage.		7.75	
10 Crocker.	80c	50 Silver Hill.		35c	
10 Confidence.	3.00	270 Sierra Nevada.		4.55	
200 Dudley.	2.	300 Scorpion.		7.75	
400 Empire.	1.50	225 Union Con.		4.50	
470 Gold & Curry.	4.90	180 Utah.		1.50	
200 Grand Prize.	1.00	50 Yellow Jacket.		5.75	



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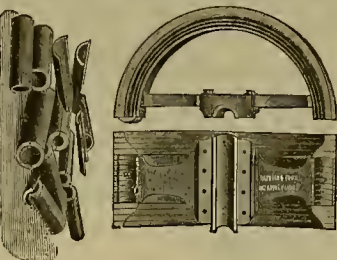
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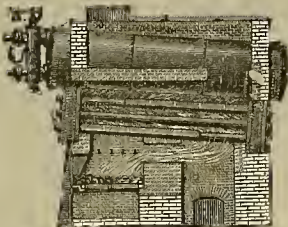
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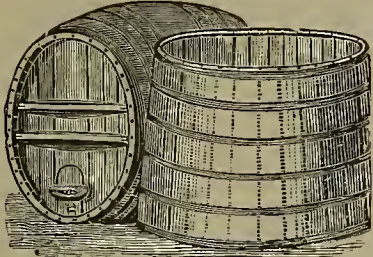
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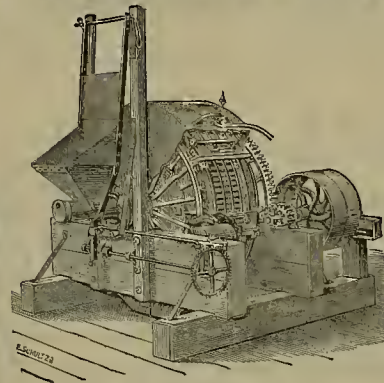
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WORKS ORE WET OR DRY.

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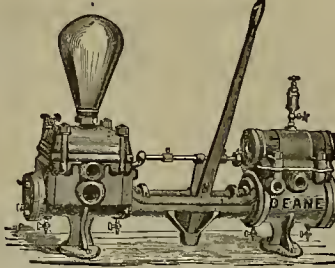
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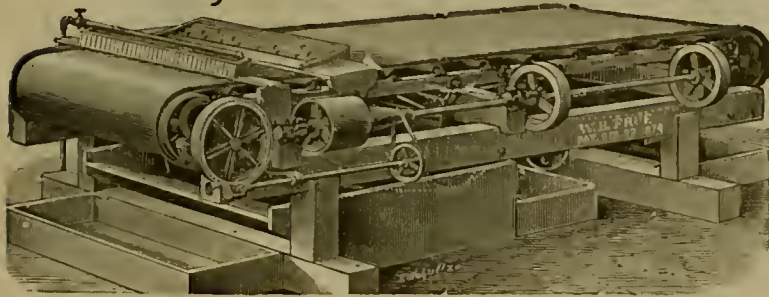
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FULL WEIGHT OF SILVER AND BEST QUALITY OF WORK GUARANTEED.

GET OUR PRICES BEFORE ORDERING ELSEWHERE. SAMPLES  
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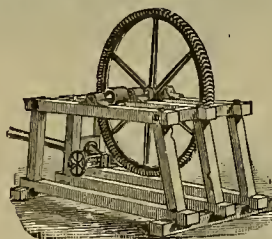
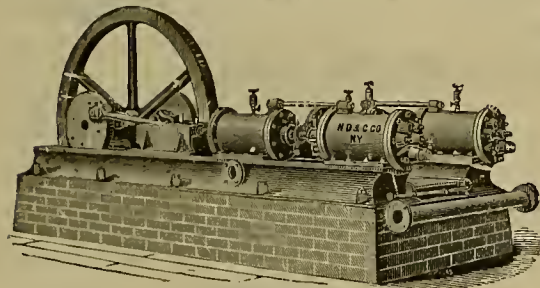
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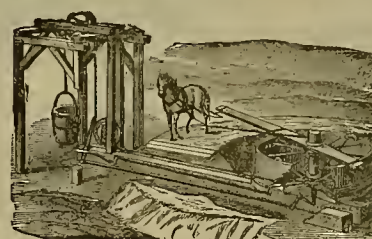
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**NATIONAL AIR COMPRESSORS.**

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As Sold on the Pacific Coast.



**KNIGHT'S WATER WHEEL,**  
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**MILLS, PUMPING AND HOISTING.**  
Over 300 in use. All estimates guaranteed. Send for Circular.



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One horse will easily handle rock or water to a depth of 350 feet, giving entire satisfaction to the prospector.  
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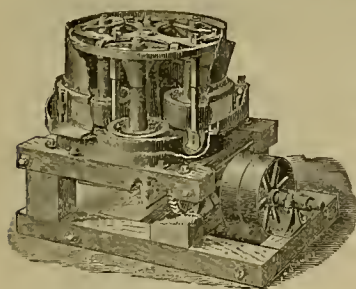
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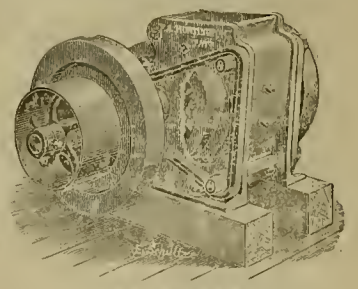
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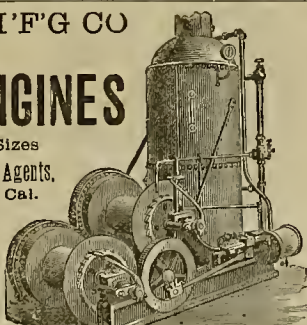
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MANUFACTURER OF

**HOISTING ENGINES**

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**Blasting Powders.**

**Vigorit "LOW" Powder,**

**FOR REMOVING STUMPS AND TREES,**  
**HAS NO EQUAL.**

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VIEWS OF  
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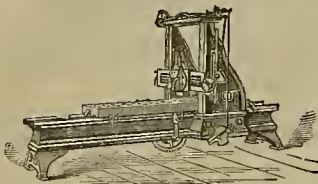
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Extra sizes and lengths made to order on short notice  
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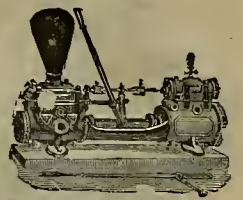


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Mining Machinery, Steam Pumps, Wood and Iron Working Machinery  
**ENGINES and BOILERS.**  
 SEND FOR CIRCULARS.

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Steam Pumps of all Makes,

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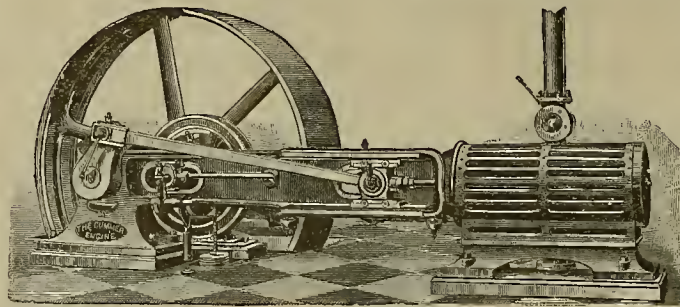
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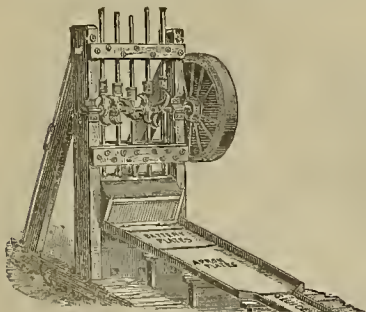
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**Silver-Plated Amalgamating Plates**

For Saving Gold in QUARTZ, GRAVEL and PLACER MINING,

At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best, and far superior to others in weight of silver and durability. Old mining plates replated. These plates can also be purchased of JOHN TAYLOR & CO., cor. First and Mission Sts.

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653 &amp; 655 Mission St., San Francisco, Cal.

NOTICE.—Mining men are cautioned against fraud in purchasing poor mining plates made in this city; they have proved defective in the Silver-plating, and in having much less Silver than was contracted for. When in doubt make an assay; thin, light Silver-plating looks the same as heavy. **SEND FOR CIRCULAR.**



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First Premium Awarded at Mechanics' Fair, 1884.

**CLOT & MEESE,**

Sole Licensed Manufacturers of the

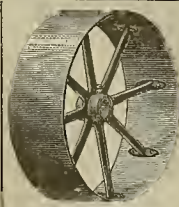
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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, JANUARY 14, 1888.

VOLUME LVI  
Number 2.

## The New River Mines.

We had a conversation a few days since with Mr. Toma of the Ridgway Mining Co., New River, Trinity county, who passed through this city on his way to London, where he goes to consult with the English owners with regard to the work to be done next season. It is proposed to run a tunnel some 700 feet to drain the mine. The ledge was followed down 240 feet, but there is now so much water that the drain-tunnel is proposed.

Mr. Toma says that the New River region is a pretty rough one just now, there being plenty of snow and no roads. In his opinion, it is only a question of time when the camp will come to the front. The great trouble has been that the miners there are mostly all poor men, but the mines are being worked and put in shape for proper development. There are now only about 100 men in the camp, most of them having gone away for the winter. The boom the district got when first discovered was bad for it, as it came too soon and before they knew what the claims amounted to. Very few sales of mining property have been made. The Ridgway mine sale was made in London. There are a few small mills in the district, and the ore is all free milling.

In Mr. Toma's opinion, when a good road is built into the district it will be from Weaver-ville. So far most of the supplies, etc., are packed in by way of Callahan's ranch; all the machinery had to be packed in also. It may take a few years to develop the camp properly, but the mine-owners have faith in the good showing they have made. In the bottom of the Ridgway they have a four-foot vein of fine milling ore that will average \$40 per ton, some of it running up to \$100. The Golden Gate is a very fine prospect and so is the Carrie. The Mountain Boomer has paid right along and has ore worth \$80 to \$100 per ton. The Uncle Sam makes a good showing, and several other claims are doing well in a small way. Prices of provisions are not as high as might be expected, as it is only 45 miles to Callahan's, and vegetables, fresh meat, etc., are plentiful. For a mining camp, articles may be purchased quite reasonably. There is plenty of water in the district for use in the mills, but not enough for power. There is no chance for water-power nearer than Virgin and Eagle creeks. If this could be utilized and transmitted to the camp by electricity it would be a great thing for the district, and the subject will be investigated in time. It is the general opinion that when the present obstacles to successful working are removed, many other mines will be properly developed.

THE *Phoenix Herald* says: There is no mistaking the richness of the placer diggings in the district of La Paz and Ehrenberg, Arizona, on the Colorado river, but the scarcity of water renders the working of them almost an impossibility.

It is reported that the Temescal tin mines, near South Riverside, are soon to be practically worked.

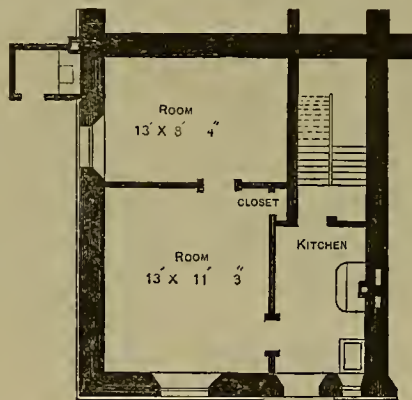
## Workingmen's Houses in Mulhouse.

Mulhouse in Alsace is noted for its industrial societies, which care for the dwellings

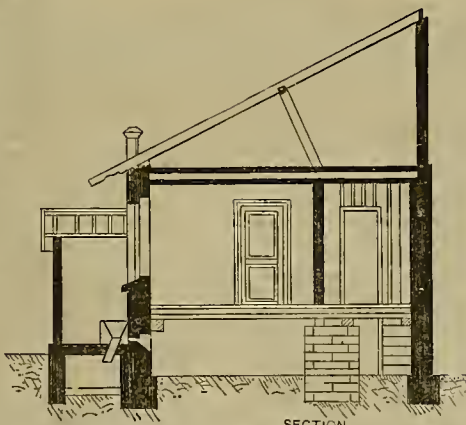
a speckled rough coating in hydraulic stone and mortar. The rain-water, with that for the kitchen, runs away through paved trenches near the sidewalks until it reaches a sewer.



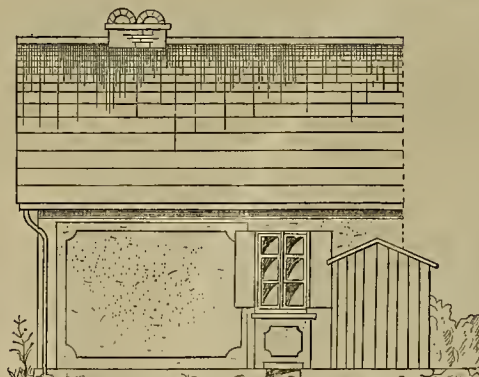
ELEVATION  
FRONT



PLAN



SECTION



ELEVATION  
SIDE

WORKINGMEN'S HOMES AT MULHOUSE, ALSACE.

of workingmen employed in the factories there. In a recent number of this paper we gave a description of one of the types of homes in that place. On this page are shown elevations and plans of others. The price of a group of houses such as are shown in the cut is \$1971.60. The area covered by a house is 52.76 square yards; the total area covered by a house and garden is 180 square yards. The monthly rent charged is \$2.60. The lintels and window-sills are of stone, and on all the stone lintels there are delivery-pipes. The walls are covered with

The houses are embanked outside. By paying \$3 72 a month instead of \$2.60, the tenant becomes the owner at the end of 15 years. The cuts are self-explanatory. The plan shows one-fourth of a block, and there are four houses in each block.

The latest discovery of gold and silver in the East is at Warsaw, Wisconsin, where \$40 gold ore is reported. Strange to say, no "old California prospector" has turned up with a favorable opinion.

## Mineral and Agricultural Lands.

It is a defect in our system of land laws that mineral land may be readily taken up and patented as agricultural, unless some interested individual chooses to make a contest. In most cases there is no contest. Men make application for patent on the land, and unless there is some one who knows of mineral there, and is interested in reserving it, goes and makes a sworn statement, the land is given to the applicant. A good deal of mineral land in this State has been taken up in this way, and the prospecting area thereby much reduced.

They are having difficulty of a similar kind in Montana, where the railroad company is getting possession of mineral land, though it cannot be directly and immediately proven to be such. The point is that a large portion of the mountain lands in Montana, which are surveyed by Government surveyors, are returned to the General Land Office as more suitable for agricultural than mineral purposes, and that immediately upon being so returned they become subject to the action of the Northern Pacific land grant as far as odd sections are concerned, and that the company upon the payment of fees can demand patents for the lands, and that after a patent has been issued the lands become indisputably and solely the property of the railroad company, whether containing mineral or not; and no person can contest the right of the company to these lands, that privilege resting solely with the Government, and even it can do nothing unless fraud is shown in the procuring of the patent.

It is suggested that a remedy for this is for the people of Montana, and especially the mining portion, to petition the General Land Office and Interior Department to declare all mountainous country mineral lands, and thus exempt it from the action of the Northern Pacific land grant, and throw the burden of proof as to the agricultural character of the land upon the railroad company.

If the private claimant or a railroad company once gets the patent, the title cannot be disputed except by Government, and by it only on the ground of fraud. A protest has been sent to the Secretary of the Interior detailing the situation and asking that patents to the Northern Pacific railroad for lands in the mountainous districts of Montana be withheld for 60 days, until ample proof could be furnished the President and Congress that all mountainous lands in Montana are more valuable for mineral than for agricultural purposes. The protest also states that all mountainous lands

in Montana are mineral and not agricultural. THE December pay-rolls on the Comstock mines amounted to upward of \$220,000. This does not include Silver City mines or mills. Cons. California and Virginia pays the largest amount—\$45,915.

THE Vizona mine at Tombstone, Arizona, has been sold under a deed of trust for \$4000. It was purchased by the Ground Hog M. Co. The mine, which has been idle some time, will now be worked with a full force.



## CORRESPONDENCE.

We admit, unindorsed, opinions of correspondents.—Eds.

## Crushing Quartz.

## A Comparison Between Stamps and Rotary Pulverizers.

[Written for the Press by W. C. STILES.]

This article is intended for practical thinking men, for such I am supposing myself to be addressing. We are in an age of progress. What we thought to be an impossibility yesterday can be done to-day, and the man who proclaimed it yesterday was considered a crank. What made him a crank? Simply this and nothing more, he dared to think and act for himself; hence I place myself in a cranky position for daring to attack so popular a machine as the present quartz-mill—the stamps and batteries. Men undertake great works who have some motive, and are apt to go in old tracks expecting to have some new ones present themselves. They are not thinking for themselves. They are guided as the locomotive is guided with two rails lying parallel. The thoughts I am penning may not be original, yet the work may appear so in the end.

## The Present Method of Reducing Ores

Is as old as the hills—in fact nature teaches it by one rock beating against another, crushing some parts to an infinitesimal powder and leaving others in larger form, say from the size of grains of wheat upward. When any one wishes to prospect rock he selects a few pieces, places them in a mortar, gives them a few beats with the pestle, turns the mass into a sieve and shakes it, leaving the coarser in the screen. This being done, he repeats the pounding, liberating more of the sand, etc., until all is ended, if he is driving at fine results. But if roughing it, his first and second crushing is sufficient to arrive at some conclusion without wasting time on what a practical man knows is of little value compared with that he has already liberated. If in the first and second pound he gets no results, the word of an old miner for it, he will not look to find it in the third and fourth and at the finish. Now the question is this: Does the first and second crushing liberate the rich or worthless? If the rich, then if possible remove it from the deteriorating influence of the worthless gangue, and the sooner the better. This, the

## Battery System of Crushing.

Cannot do, for when a piece of rock is placed in a battery there it must remain until worn out by attrition or blows from the pestles. We now take for example a piece of rock weighing one pound. This piece falls directly under the stamp. The weight falls, this piece of rock is crushed and knocked into thousands of pieces; the soft yields to the hard, leaving many pieces varying in size from a mote to a good-sized bean. This begins to form a bed for other pieces falling into the battery to lie upon. As the battery is jarred it is reasonable to suppose that the heavier parts are settled to the bottom of the battery. If they are gold, it at once places the precious metal in a bad position. If it consists of sulphurets, it also does the same with them. Now when do these heavier and most valuable parts get away from this eternal pounding? To satisfy ourselves about

## The Wear of Gold

We need but take a piece of gold, say a \$2.50 piece, give it a slight rub against a stone, and the stone is not affected, but marks are visible on the stone of the presence of gold. In crushing a ton of ore containing \$8 per ton we crush with it 64,000 times its weight and 320,000 times its bulk in quartz sand. This rubbing motion goes on for days if it does not accidentally get out, or is attached to the linings inside, which you say it does in a short time after it becomes detached from the matrix. If so, why can we find the finer particles of sand assaying much more than any other portion of the sand? From this it is plain to be seen there is something wrong. The power expended on the stamp is too great for the work done. The power required for one stamp dropping 90 drops per minute is  $1\frac{1}{2}$  horse power. The stamp is supposed to do two tons to the stamp (the average is less). The stamp requires more power to run when there is little to do than when full. The stamp breaks off instead of showing an even wear. (I am speaking of ordinary shoes and dies.) Now comes the question,

## Can There be a Plan Devised

By which this mighty waste may be obviated? I answer, yes. The rock-breaker is the first step taken for breaking and placing the ore in a condition for saving. When the rock is given a squeeze, or pinch, or crush, it at once lets the mass go. The rock is cracked and broken in its weakest place, as where seams of sulphurets and gold join the silica together. These sulphurets fall out and also the gold. Then they should be taken away from the large, hard silica which remains intact until the end. But as a general thing the sulphurets fall away in lumps varying in size from a pinhead to a fist-bert. This, then, is not in concentratable form, and has to go through other rock-breakers or pulverizers until all is liberated from the gangue and can be banded by some concentrator best adapted to coarse and fine crushing,

which will be treated on during this article. The question will arise here,

## How Fine Must we Crush?

One kind of ore requires one degree of fineness, and another a much finer. We will take, for example, our ores as they come from Nevada, Placer, Amador and Shasta counties, and, in fact, throughout the State, and they will stand a No. 16 wire-screen, giving at this point greater satisfaction in sulphurets and free gold than at any other point. The sulphurets are coarse, and there are less slimes. The gold is as natural as old Mother Nature formed it with no wear or tear, and left to rest as soon as set free from its mother bed. Now comes the manner in which this thing may be accomplished. The Cornish roll will do this work to perfection, but the Cornish roll is not a good stayer, that is to say, the parts that are brought into use on the ore are soon in bad shape, so that it is not profitable to work them. Some other plan must be made use of to arrive at the required end, viz., leaving the gold and sulphurets in a granulated form without so much wear of machine. And now comes the cranky part of this article.

I propose to place before the public a machine which is to cost but one-eighth of what a stamp plant costs, but one-tenth the weight, and requiring but one-half the power to reduce the ores. The wear and tear is not as great as the stamp batteries, and but little time is required for renewing parts; when once renewed the mill is as good as when it first came from the foundry.

## The New Mill Pulverizer.

As now built for best practical results, is small and compact, requires but little room and takes but small power. It will crush wet or dry, as best desired. The total weight of the mill for ten tons in 24 hours is 1000 pounds. Three mills will crush 30 tons per day, leaving the gold perfect and the sulphurets the same. The largest piece of this mill will not exceed 240 pounds in perfect shape for packing over the worst sort of country.

The concentrator will handle 10 or 20 tons per 24 hours. There are two sizes built; total weight of small one, 750 pounds; large one, 1000 pounds. It will handle any kind of ore rapidly, giving the best satisfaction.

## Action of the Pulverizer.

Many are anxious as well as curious to know how so small an amount of iron can do so much work. There is no secret about the working of this pulverizer. It is plain in construction and when put in motion it explains itself. It is positive in action and nothing slips, but fastens itself to the jaws or revolving disks, letting go its hold after passing a given point in its revolution. Nothing is carried through the second time. It pinches the rock to the size the mill is set to, dropping, for further reduction, though still finer set machines.

This machine will pulverize half an ounce at one revolution, taking the quartz from the rock-breaker the size of filberts or walnuts, and reducing it to the size of ordinary beans. Much of this crushing will go through a No. 40 screen and all in a granulated form. This is passed on to the concentrator and is as a general thing the richest portion of the quartz. The balance goes through the same process for reduction, fracturing the ore in its weakest points, when it again undergoes a sifting, taking the rich ore from the poor, each time the pulverizer is set firmer. Some idea may be formed by the following

## Description of the Machine.

The pulverizer is made with two compartments, each independent of the other, so that one may crush coarse and the other fine, or both coarse or fine. Each compartment presents a working surface of 110 inches; the two, 220 square inches. In order to do one-half ounce each revolution, the mill will have an average of a little over one grain to the square inch of working surface.

Suppose the mill to run at a very moderate speed of 600 revolutions per minute, it would then pass 300 ounces or 18 $\frac{3}{4}$  pounds. This for one hour is 1120 pounds, or for 24 hours 26,880 pounds. Can any man say how long it would take to wear four steel plates with but one grain of quartz average to each square inch down three-eighths of an inch?

Now let us suppose that they would wear out in 24 hours. The cost would be 30 cents per ton. If they have life for two days the cost would be 15 cents, and should they last eight days, then the cost would be 3 $\frac{3}{4}$  cents per ton for each ton crushed. But a figure will be made at 30 cents, and the batteries are scarce that will compare with it. Nothing has been said about the

## Saving of Precious Metals

In per cents in a stamp-mill. We will deal with from \$5 to \$10 medium-grade vein stone. The time has been when each rock would yield but 50 to 60 per cent of its true value. The mills give better results now, say 70 or even 80 per cent. This is accounted for by their not eliming so much. If this sliming ceases and 90 or 95 per cent of the sulphurets can be saved, then the same amount of gold can be saved. Now if ten per cent can be saved with the new system on \$10 ore, it would give an extra dollar to be placed to the credit of new mill, which wipes out wear and tear entirely.

Another thing to be considered is power. Suppose a stamp can be run for 25 cents per ton and the small mill takes but 12 $\frac{1}{2}$  cents per ton, there would be a profit of 12 $\frac{1}{2}$  cents over the old method which wipes out half the wear again. Space, loss of quicksilver, etc., are

great items which figure largely in low-grade ores as well as high.

One cent per pound in quartz rock gives \$20 per ton in value; a little over one-third of a grain of gold, a piece as large as a pin-head. We will crush one pound of ore to the size of one-sixteenth of an inch. In order to pass No. 16 sand, it must be reduced to one-thirty-second, for the reason that the wire takes as much space as the holes occupy. Then, if we reduce the ore to this size, all being equal there would be in one superficial inch 1224 grains of sand; for one cubic inch, 32,778. This is but the one-twelfth of a pound—393,216 grains to the pound. Supposing them to be of equal size, the gold would be about as one to 98,304. We start off with this proposition, there being 98,304 grains of sand to one of gold. How long will this grain of gold last before becoming slimed sufficiently fine, so that slightly moving water will hold it in suspension as easily as it holds other matter for an indefinite period?

## Drop of Stamps.

Our stamp-mills in early days made 60 drops per minute. A well-appointed mill at the present is supposed to drop 90 drops per minute. For one hour, 5400; for 24 hours, 129,600 to the single stamp; for five-stamp battery, 648,000 drop. The Treadwell mill of 120 stamps, on Douglass island, Alaska, gives 15,552,000 drops per day. What is this almighty racket kept up for, day after day and year after year? To liberate gold, say at the rate of \$3000 per day, then for every dollar saved the stamps have made 5184 drops and saved 160 pin-heads, or its equivalent in size. This estimate is at 300 tons per day, at \$10 per ton, or 51 drops for every cent.

## Fine Crushing.

Suppose we have not crushed our ore fine enough to liberate all the gold and there should be a piece of sand, half gold. In ordinary handling this would be rolled along over the copper plates and other devices for saving and lost. This is wrong, for if we take these sands containing gold, they can be horned or panned out, from a sampled lot, say an ounce or pound of ore. Then why not on a larger scale? A piece of quartz half gold stands as one to 6 $\frac{1}{2}$ ; now our piece of sand is half gold. It has passed the No. 16 screen and been subjected to the action of water. The shape varies considerably. The specific gravity does not save it, but it is drifted among the waste, although the piece weighs 6 $\frac{1}{2}$  times as much as its associates. Here we must look for the cause, which has already been answered. Now we have a piece with but one-twelfth gold and eleven-twelfths silica. Then this piece, although nearly all quartz or silica, is five-twelfths times heavier than the pure silica, and fully as heavy as the sulphurets that are being saved by the present mode of concentrating, viz., the Frue vanner and Triumph machine.

## Gold in Quartz.

The gold in quartz rock varies, and sometimes we find pieces as large as your fist. Other pieces of quartz have little pockets in which the gold is found in all manner of shape; then it is found in seams of the rock, binding the rock together like wires. When this ore is fractured it will follow those seams; it also does the same if filled with sulphurets. This being the case, let us put a piece under a pressure of 1000 pounds to the inch, and the silica immediately gives way and the gold is left in its primitive state, with the marks of the matrix upon it. If left to rest and there is no more rubbing, we get all the gold the rock contains; but if allowed to be operated on by foreign matter it is carried away as before described.

## Iron in Mills.

The statement in regard to batteries is easily figured. One stamp (the ordinary stamp) with mortar, chafing, hoxes, bolts and frame, will average one ton to every stamp or 10,000 pounds for a five-stamp battery. For crushing 100 tons of ore per day it would require 50 stamps, each to crush two tons or altogether 100,000 pounds of iron and wood for frame, etc. The stamps crush about one-half of an ounce of rock each drop, which can be done with an ordinary hammer if properly applied. They require  $1\frac{1}{2}$ -horse power each to drive them. Then according to this calculation we employ a stamp to crush out two cents per minute, requiring  $1\frac{1}{2}$ -horse power; for 50 stamps, 56 $\frac{1}{2}$ -horse power. After the foundry and machine work has been done are we ready for operating this ponderous amount of iron? No. There is freight to the mine, grading for the millsite, etc. Care must be taken to have it solid and nothing light will answer. Independent of these mortars and stamps a large engine must be provided. If to be run by water-power, a wheel of suitable size must be built, for 56 $\frac{1}{2}$ -horse power is not always at command. To move this 100,000 pounds would require 25 teams of two tons each, or 4000 pounds. These teams when under marching order would occupy one-fourth of a mile. If this material is to be packed over mountains it would require 500 mules to do it, each taking 200 pounds. Supposing each animal to occupy eight feet, and we have a string of packers 4000 feet long, or four-fifths of a mile. This would be a fine sight up in Alaska where the beasts of burthen are allowed to go as they please, down off the trail into the underbrush, down into the canyon, etc. It is a good thing that this machinery has to be put upon the cars from drays. Then we have the handling of 100,000 pounds of freight at one cent or five

cents per pound. If at one cent it cuts up \$1000. If the maximum figure, \$5000.

The machinery on the ground, skilled labor is required to adjust it, which is not always at command, even in San Francisco. We have already spent a little fortune in what has been done. The work now is just begun, grading first, then anchoring the batteries, etc. This being done, the work of destruction has been commenced, as has been described. The ore is sent whirling out through the mill without any more thought and tumbled into the sea.

## Loss of Iron in Crushing.

Now as to the wear of the battery shoes and dies. A 50-stamp battery requires 250 pounds of iron for each stamp, making 12,500 pounds to shoe and die. In ordinary batteries they require renewing once in a month. Each stamp is credited with crushing 50 tons. This shows a wear of five pounds to every ton of rock crushed, which is one grain and one-fifth of a grain to every ounce of rock crushed. One grain of iron is quite a nice little body, and can be weighed without any very fine assayer scales. This iron is never seen in the concentrates. Where has it gone? The cost of this material will be, say five cents per pound, or \$625.

The pulverizer, of which I speak, requires 480 pounds to shoe all round. This gives us 12,500 pounds to wear out in 25 days, allowing a renewal every day; each renewal would require two men 1 $\frac{1}{2}$  hours; 25 changes would be 37 $\frac{1}{2}$  hours, or less than 4 days in one month. The stamps require 2 men to each 10 stamps, which is 10 days' time vs. 4 days, a gain of 6 days. But our proposition is to get from four to eight times the wear out of the little mill. If four times, we would wear but one-fourth the iron and consume but one-fourth the time for repairs.

We are told by metallurgists that the water from a battery always shows traces of gold and silver. Each stamp requires 10 pounds of water per minute, or 7 tons in 24 hours; a five-stamp battery 35 tons. Now, as each quart or pound assays something, the amount in 35 tons must be several dollars, which comes from the wearing of the gold agitated in the battery, and which is resting after passing the small mill.

## Action of the Stiles Mill.

How is this expense to be avoided? Pulverizers of some kind must be made use of before any suitable results can be obtained. Our proposition was to do this work with one-tenth the weight of iron, at one-eighth the cost, and save more gold.

I propose to furnish a mill that will crush 100 tons of quartz rock in 24 hours for one-eighth the cost of the stamp, the total weight of which will not exceed 10,000 pounds. This mill will save the gold and sulphurets in a granulated form and save a greater per cent than stamp-battery has ever done. The figures show a difference of 90,000 pounds on the item of battery and stamps versus this method of revolving disks. It has been shown that the stamp will crush one-half of an ounce at each drop and can drop 90 drops per minute. The revolving system will produce each revolution half an ounce to three ounces. There may be 10 revolutions or 1000 revolutions per minute, each whirl producing the amount set forth, viz., one-half ounce or more, preparing the sand for concentrating and amalgamating. These concentrates are the first to give way under pressure, and are removed from further crushing until wanted, when they undergo finer pulverizing with but little wear to the machine and no wear to the gold. The richer parts of the rock are broken away from the poorer at the beginning, in the proportion of 1 to 4—that is to say, one-fourth of the rock is made fine enough through the first mill.

It may be well to say here that the pulverizing is done by degrees, the first mill making it the size of corn; second to wheat, and the third to finish, leaving the gold to rest after the third crushing. This first sifting, although giving but one-fourth fine, contains three-fourths of the sulphurets in the ore, proof positive that the higher portion yields to the first blow, and should be protected then and there. The second crush liberates two-thirds of the remaining sulphurets and gold. When the rock is treated in this manner by degrees, the gold, instead of being made finer, is rolled larger so that very little of it will go through a No. 30 screen or 900 mesh to the square inch. It may be readily seen by a practical man that the gold will always be found in one place, while the sulphurets are undergoing concentrating without any danger of the gold being carried away with the moving water, of which we now propose to treat.

## The Concentrating Tables.

The Stiles concentrating tables have a capacity of 20 tons per 24 hours. The structure is a vibrating table operated by a cam, the area of which is 2000 inches. The pulp is fed on the upper end where a stream of water carries it from beneath the revolving disks and automatic screens of the mill. This table is subdivided into 32 compartments. The material in each one of these compartments is kept in a soft, mushy condition by an automatic scraper passing through the pulp four or five times per minute, always scraping up but never touching the pulp in its backward course.

As the sands are kept soft, it is difficult for the heavy particles to go over this soft spread bed without sinking into the mass. When once buried, one or two sands cover them and protect them from the action of the moving water. As the table is continually jarring, these



particles are drafted toward the head of the table, assisted by the moving scraper. As this scraper approaches the head of these compartments it rises out of the concentrated mass, carrying a portion upon a rille on the next shelf or compartment. A carrier to B, B to C, and C to D, where they are landed into a tub or vat with the gold and golden sands for amalgamation. Here you are with your sulphurates, if you have any, but your gold is safe at this point, the thing of all others we have so puzzled our brains about. Any one who is familiar with the concentrating of ores knows that handling 20 tons of sand per day is big work. He will spread one cubic foot of sand over the surface of the table and it would not be one inch deep over the entire table. But we do not propose to put a cubic foot of sand on per minute, for if we could work that amount we could handle 72 tons per table. Now what we desire to do is to work 18 or 20 tons or say one-fourth of a cubic foot. Then there would require a removal of sand of an average of one-fourth of an inch per minute. In case you do not use water enough, the sands will bank on the table. The first minute, one-thirty-second of an inch, and in eight minutes the table has an overplus and becomes useless. But an over-supply is favorable to the best results. The water will carry away the worthless, leaving the best always free. This concentrator will carry a certain quantity of sand before anything is discharged. After the table is full then the separation begins, the good at the upper end and worthless at lower end, where it will remain until displaced by an additional amount of sand from the pulverizers. This is a safety machine, for the heavy will be driven to the bottom by the concussion, and the light carried off by a current of water. These concentrators are made of iron and steel, the heaviest piece weighing but 162 pounds; total weight of machine, 1000 pounds—complete and intended to work on any kind of ore.

It is specially efficient on galena or carbonate ores. The power required to run one of these machines is rated at 4-horse power. The cheapness of the machine places it in the power of a poor man to buy, and he saves his gold without placing it in the hands of strangers. Our task is ended, and if any one can be benefited we are pleased to hear you say so.

**MINES AND NEWS-PAPERS.**—The papers in all mining districts are urging miners to contribute mining items for publication in their local columns. Miners should heed these appeals, for if they look over the Denver dailies as also the mining papers of San Francisco, St. Louis, Chicago, and New York, they will find that the majority of the mining items appearing in their local newspapers are copied in metropolitan papers. The miner should understand that although his local newspaper may possibly have somewhat of a limited circulation, it has also an exchange list, which gives a medium through which well-written articles can reach thousands of readers all over the world. Support your home paper whether you dislike its editor or not, even if you do not fancy its appearance. The press is friendly to the mining interests without regard to locality, and no charges are made for publishing facts about the progress of mining enterprises. Don't expect the editor to take greater interest in your welfare than you do yourself; though as a general thing editors do. Mining items ought to originate with the miner, leaving the paper the simple task of publishing them.—*Register Call.*

**H. S. MOREY, proprietor of the Placerville Foundry and Machine Shop,** is putting up a steam engine to run the machinery of his shop. He has heretofore relied upon water-power for this purpose, but owing to the ditching freezing up, and at times no water in them to supply his demand, he has been seriously inconvenienced. The same power will be utilized to run Beach's box factory, which has been idle for want of water.

**LUMBER FOR SAN DIEGO.**—During the past year 350 vessels entered the port of San Diego with lumber cargoes. The total amount of lumber carried by the vessels was 154,160,000 feet. A fair average of the price obtained for the lumber would be \$30, at which figure the value of lumber importations at the port for the year would be \$4,614,600.

### A Glimpse at Santa Cruz.

We here give a glimpse of the city of Santa Cruz as seen from an adjacent elevation, the view being westward out upon the bosom of the Pacific ocean. For this engraving we are indebted to a publication by the Santa Cruz Development Association, already named and written by Mr. I. H. Raymond. It is one of the best written of the descriptive pamphlets now being issued about California points, and should have a large circulation. The history of the region from the first period by Cabrillo in 1542 is sketched in a very interesting manner. The charms and resources are all faithfully put forth, and not least interesting is the appendix which contains a list of the fish of Monterey bay and the native trees and shrubs of the Santa Cruz district by Dr. C. L. Anderson. We have not space to reproduce these important matters. In connection with the engraving, however, we give a paragraph descriptive of Santa Cruz City as follows:

Situated on the northern side of the bay of Monterey, that magnificent horseshoe-shaped sheet of water, 22 miles from point to point, which indents Monterey and Santa Cruz counties, the city of Santa Cruz extends backward from the beach across a slightly elevated plateau, and then climbs two or three terraces, which encircle the lower part of the town like the seats of an amphitheater. The business portion of the town lies on this plateau and along the water front. The main street, Pacific

### Elko Shale-Fields.

It is not generally known outside of Elko that valuable shale deposits or veins exist in the immediate vicinity of Elko. Their existence has been known by the Elko folks since the first organization of the town, in 1869, and in consequence of these large bodies of shale being encountered it was believed that coal must exist, hence a great deal of prospecting for coal from 1871 to 1873 without any very substantial results. The most of the prospecting was done by individuals who possessed slender means, and the result proved nothing but a failure to the parties concerned, as they did not sink deep enough. In 1872 the C. P. railroad sunk to the depth of 300 feet. At the bottom they struck a four-foot vein of coal of what was believed to be a fair quality of anthracite. But at this point a perfect deluge of water was encountered, and Mr. Mitchell of Pennsylvania, under whose charge the work was being carried on, pulled up his machinery and left. Notwithstanding these drawbacks, coal experts still contend that where large bodies of shale exist coal may be found, and that all that is required is capital. This shale-field lies on the east side of the town and river about one and one-half miles. About one year ago the larger of the several veins of shale heretofore opened was relocated by W. W. Rogers, late county recorder, and Joseph Lang. I also understand that James Russell is interested in the same. These gentlemen have taken out several car-

### Academy of Sciences.

There was no contest at the annual election of the Academy of Sciences on January 3d, and the regular ticket was elected as follows: President, H. W. Harkness; 1st vice-president, H. H. Behr; 2d vice-president, George Hewston; corresponding secretary, Henry Ferrer; recording secretary, William F. Smith; treasurer, I. E. Thayer; librarian, Carloe Troyer; director of museum, J. G. Cooper.

Trustees—Chas. F. Crocker, D. E. Hayes, S. W. Holladay, George C. Perkins, Jacob Z. Davis, E. J. Molera, E. L. G. Steele.

The treasurer's statement showed: Balance in bank January 3, 1887, \$2736.98; receipts during the year from life members, \$100; resident members, \$1524; Crocker fund, \$1200; rebates, \$39.98; rent from Market-street property, \$5496.88; trustees paid in, \$5.60; total, \$11,103.44. Expenditures—Taxes, rents, salaries, etc., \$9256.22. Balance on hand, \$1847.22. Summary of the General Fund—Balance on hand January 3, 1887, \$2175.96; receipts as above, \$7166.46; total, \$9342.42; disbursements, \$8256.22. Balance on hand, \$1086.20. Crocker fund—Balance January 3, 1887, \$561.02; receipts during the year, \$1200; disbursements, \$1000; balance on hand, \$761.02.

The thirty-fifth annual report of the librarian showed the number of books received during the year to have been 2825.

It was reported that 114 specimens had been received in the museum. In the herbarium 1750 specimens were received. Additional

cases are needed in the department of mammals and birds. Many a specimen were received in the department.

Corresponding Secretary Henry Ferrer made his report, telling what publications had been sent and what letters had been written to members and foreign correspondents. The exchange list includes about 600 societies and individuals.

The recording secretary's report showed: Added to membership during the year, 14; lost by death, 4; resigned, 8; dropped for non-payment of dues, 16; total present life membership, 268. Three bulletins had been published, the last, No. 8, completing the second volume.

Professors Joseph and John Le Conte of the University of California were unanimously elected life members of the academy. The following were elected honorary members: Prof. Alexander Agassiz, Joseph Leidy, L. P. Langley, J. G. Browngood, Francis P. Walker, A. E.

Verrill, W. K. Brooks, Mrs. E. B. Crocker, E. D. Coke, A. S. Packard, E. V. Riley, George H. Horne, Clarence Dutton, Elliott Coues, C. B. Corey, Alphonse de Oudall, H. B. Medlicott, James Hector, W. G. Farlow, C. T. Cressoy, Joseph Lovering, Francois Crapin, Maurice Chaper, Theodore Loeferle, E. A. Regel, M. D. Sansure, D. C. Danillson and G. A. Saz.

### New Mexico Copper Mines.

The New Mexico *Interpreter* says: The rapid rise in copper will have a tendency to put into active operation all the rich copper mines of the Territory. The former price forced the copper properties of the West to either shut down or to run on little or no profit, but with advance of price from six to seven cents per pound the industry will be rapidly developed and unproductive properties be made to pay.

New Mexico has some copper properties which under the present price of copper will pay well. The copper and lead mines at Red Cloud, 45 miles north of White Oaks, will pay to haul to Albuquerque, 115 miles. The Tenderfoot mine, that is developed to a depth of 115 feet, has a fine body of ore that will and should be worked, but during the depression in copper and lead it could not be made to pay, counting the long wagon haul. The same could be said of the copper properties of the San Andreas in Socorro county. The magnificent copper oxide mines of the Cahallos range, now the property of a gentleman in Wisconsin, have increased in price during the last 30 days not less than \$100,000.

**RELATIVE MELTING POINT OF PLATINUM AND SILVER.**—The total radiation of melting platinum is 54 times that of silver.



avenue, is of good width, and extends from the foot of Beach Hill nearly a mile to the Lower Plaza. It is paved with the fine native bituminous rock, large deposits of which are found in several portions of the county. This forms, without combination with any other substance, an elastic and practically indestructible pavement for streets, sidewalks and cross-walks, and is being used to replace other kinds of walks and drives throughout the city. It is possible to go from the bath-houses at the beach to the Bay View school-house, a distance of nearly three miles, without once leaving an admirably kept sidewalk. Intersecting Pacific avenue are a number of rural-looking tree-lined streets, bordered with cozy, picturesque, and even elegant homes; almost every one surrounded by well-kept lawns and gardens in bloom throughout the year. This portion of the town contains the Courthouse, City Hall, Hall of Records, postoffice, two fine buildings belonging to the I. O. O. F., a Masonic Temple, a pavilion for floral and agricultural fairs, numerous excellent hotels and boarding-houses and several churches.

The terraces, mentioned in the letter above, offer most attractive building sites, many of which are occupied by residences and grounds, where the owners have vied with each other in tasteful ornamentation and adaptation of the wonderful possibilities afforded by climate and soil. Mission Hill is formed of two semi-circular terraces and a plateau, which was the site of the original Mission of Santa Cruz, and where the Roman Catholic church of to-day stands. Hotels and churches are also found on this hill. "Beach Hill" intervenes between the business portion of the city and the beach and is a favorite location for homes and hotels.

SAWDUST is now sent to market in bales, very strongly compressed.

loads of shale and have shipped it to parties in San Francisco and Virginia City, as it is believed to be heavily charged with matter that generates large amounts of gas. The result of the tests that have been made in San Francisco and Virginia City are satisfactory, and favorable rates can be obtained from the C. P. railroad. A large number of men will be put to work in making further explorations and in taking out shale, and doubtless prospecting will be renewed with more energy than heretofore, and coal may be found, all of which will give general impetus to the business of Elko.—*Cor. Reno Gazette.*

**A COLORADO GLACIER.**—High up in the mountains of Estes Park, and near the summit of Hague's peak, there is said to exist a veritable glacier. It has been named Hallet glacier, in honor of its discoverer. It is said by the *Pike's Peak Herald* to be evidently the remnant of one of the numerous large glaciers which flowed in all the upper canyons of the St. Vrain, Big Thompson and Cache la Poudre. Its greatest diameter is about one-fourth mile. Although shrunk to such small dimensions, it still preserves its true glacial character, as evinced by the ice of which it is formed and the numerous crevasses which traverse it. The crevasses are caused by the strain brought upon the ice by its own motion, and are peculiar to glaciers. The largest on Hallet glacier is 300 feet long, 10 feet wide and more than 30 feet deep, the bottom being filled with new snow, which the sun cannot reach. There are others—some open and some covered with a thin crust of snow.

**TIMBER WORMS.**—The worms which wrought great havoc among the spruce and juniper trees in Maine a few years ago have again made their appearance in the same role.





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W. B. EWER.

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DEWEY &amp; CO., PATENT SOLICITORS.

A. T. DEWEY. W. B. EWER. G. H. STRONG.

## SAN FRANCISCO

Saturday Morning, Jan. 14, 1888.

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## Passing Events.

The whole State has experienced for the past week a "cold snap," longer continued than has ever been felt here before. In the mountains a great deal of snow has fallen, so there will be plenty of water in the streams next season. Around the bay region there have been ice and frost, to the astonishment of the "oldest inhabitant" and the disgust of the new-comer.

The Regents have appointed the astronomers to the Lick Observatory, and the big telescope has been tried roughly, so that in a few weeks we may expect the Lick trustees to turn the Observatory over to the Regents of the University of California.

A Consolidated Miners' Union is to be formed with headquarters in San Francisco, and branch organizations in mining districts all over the Pacific Slope. The main object is to influence Congressional action in maintaining a protective tariff on the products of mines.

There is very little new of moment in the mining situation on the coast aside from what is referred to in our summary of current mining notes.

THERE are now in operation in Montana Territory 35 mills containing 975 stamps, and 11 smelters having a capacity of 4430 tons. The mills crush about 2000 tons of ore daily.

THE receipts at the Helena (Montana) assay office for the past year amount to \$1,354,667.05. This represents in measure 71,114,639 ounces of gold and 36,222.35 ounces of silver.

SATISFACTORY observations have been made through the Lick telescope at Mount Hamilton,

## Why They Discover the Fountains of Wealth and Die Poor.

We attempted not long since to dispel the popular notion that the discoverers of rich mineral deposits generally come to a violent end, by citing numerous examples to the contrary. But while this theory seems so little tenable, it is, no doubt, the case that this class do, as a rule, profit little by these big strikes and rich finds. For reasons which we will in this article undertake to explain, the good luck of these men falls in a majority of instances to bring to them permanent enrichment.

It need hardly be stated that these great mineral discoveries usually and almost necessarily occur in wild and distant regions, such as only hardy and fearless, and perhaps it may justly be added, restless and impulsive men would be likely first to penetrate. But men of this character, while noted for their endurance and courage, are apt to be deficient in economy and thrift. They possess little of either the trading or the saving instinct. If they make money they spend it freely, and very often in a lavish and foolish manner. Being adventurous, they engage hastily in new projects. Entertaining large ideas, the bigger the scheme the more likely they are to take hold of it. And so in many of their enterprises they come to grief. These traits of mind found apt illustration in Marshall and Sutter, and account for their lack of business success, despite their grand opportunities. None but men of a sanguine, hopeful temperament, and possessed of a roving, adventurous disposition, like Marshall and Sutter, would have fled from civilization, and having the hardships and dangers of an early overland trip, made their way first to Oregon, and then, wandering south into California, have drifted to the back settlements of that then little settled country. They are active, brave and generous, but it is vain to look for frugality or sharp business habits in men like these, and who very well represent in their general characteristics the border man, the prospector and the mining pioneer.

Weaver basin, Trinity county, was originally one of the notably rich placer localities of California. In 1850 that part of the State was overrun by the Klamath Indians, the most brave and warlike tribe on the coast. Prospecting the country was such a difficult and dangerous business that few men cared to undertake it; yet a small number fought their way over the mountains into that singular depression, and living in the roughest manner, gathered there a rich harvest of gold; some of them, while so engaged, having lost their lives at the hands of the savages. The most of these adventurers having made a "stake," soon after left the basin, and we lose sight of them. Of those that remained, quite a number are still living there; but while all are tolerably well off, none are rich, and this not because they have been idlers or spendthrifts or in other ways dissipated their means. They have not been lacking in energy or enterprise; they have been engaged in turning rivers from their beds, building roads and bridges, ditches, flumes and tunnels, some of them works of great utility and magnitude. But the bent of mind that in 1850 carried these men into Weaver basin has since so far stuck to them that they have constantly been undertaking the premature or the impracticable, engaging in projects the success of which has involved too many risks and contingencies or in other ways taking desperate chances. And these pioneers of Weaver basin are typical of a large class of early miners.

In 1858 many thousand men leaving California emigrated to British Columbia, having been attracted to that country by the reported richness of the Fraser River mines. Disappointed in these diggings, nearly all of this emigration soon returned to this State. A few of these adventurers, however, determined to direct their course toward another quarter in their search after gold. Traveling southeast, they explored the country off that way for many hundred miles before they found anything to reward the dangers they had encountered and the incredible hardships they had endured, the region traversed being without any white settlements and infested by unfriendly Indians. The first pay digging struck were in Boise basin, Idaho, the still richer placers at Bannock and along Alder and Confederate gulches, in Montana, having soon after been found. Here the first comers reckoned their daily earnings,

not by dollars, but by ounces, and in some cases even by pounds of gold. Yet little did it avail the most of them. Not one in 20 ever retained any considerable share of his gettings; scarcely one in a hundred left the country rich. The very impulses that carried them to these marvelously rich gold-fields betrayed them into a course of life that led to their final impoverishment.

Their love of excitement, when they had the means to gratify it, plunged them into every manner of dissipation. Their natural generosity caused them to give without stint or reason, while their disposition to take desperate chances and to court fortune by hazardous methods caused much of their "piles" to go over the gambling table, these Montana mining camps having for years been a very paradise of the sporting fraternity. Careless of their own lives, these men were apt to be careless also of the lives of others, and so fatal encounters were not uncommon. Few of them ever left the diggings, the lives of a majority having, by one means or another, ended prematurely, if not always by violence. William Fairweather, the discoverer of Alder Gulch, supposed to be the richest ever found, died poor, having drank himself to death a few years later. He occupies an unmonumented grave hard by that famous locality. The most of his companions perished in the same way, fewer of these men having died violent deaths than is generally supposed. Following the discovery of these bonanza placers, large numbers of vicious characters swarmed into Montana, where, becoming at last unendurably dangerous, they were judiciously thinned out by committees organized for the purpose. But few, if any, of the pioneer miners suffered at the hands of these improvised tribunals of justice.

That this class of men, wherever we find them, are rough in their manners, nomadic and improvident, indulging all too much in hurtful excesses, must be admitted; but that they are inherently corrupt, vicious or depraved none will contend. Neither in this nor in any other country have their names figured much in the criminal calendar. What has here been said explains, we think, how it has so often happened that the discoverers of these great mineral finds have profited so little by their good luck, while it serves to correct at the same time the prevalent but erroneous notion that this class of men have generally met their end in some tragic or violent manner.

## Iron.

The stocks of iron here at present are quite moderate, and prices are higher than they were a few months ago. Stocks on hand now only aggregate 7535 tons. Of this, some 4295 tons are held by the foundrymen. The city foundries and mills melted last year 13,350 tons of pig iron. The scrap iron imported equaled 24,461 tons.

During 1887, according to the statistics compiled by I. Stewart, we imported 9430 tons of pig iron from Great Britain, and 1275 tons of soft iron from the Eastern States. From the stock of the Oswego Iron Co., Oregon, we procured 300 tons; from the stock of the California Iron & Steel Co., 900 tons; and from the stock of the Puget Sound Iron Co., of Port Townsend, 2505 tons.

The iron resource of the coast are not being developed to any great extent. The Puget Sound Iron Co.'s furnace at Port Townsend has been the only furnace on the coast in blast during the year, and that only for a short time. This company intends putting this furnace in blast again about March or April next.

There is talk also of developing the iron in the mountain at Dagget, San Bernardino county. A company has been formed to open the mine, build furnaces, rolling-mills, etc. Thus far the project is only on paper, as far as we are informed, but there is so much enterprise now being shown by the people of the southern part of the State that the plan may be carried out in all its magnitude.

C. F. McGLASHAN of Truckee, who has a collection of 20,000 butterflies and moths, has applied for a patent for preserving and exhibiting entomological specimens. It consists of hermetically sealed glass cases, in which the insects are pinned to small pieces of cork cemented to the glass. It is claimed that the invention will popularize entomology.

## The Corner in Copper.

The copper miners of California, Arizona and Montana can congratulate themselves that the French syndicate succeeded in effecting the corner in copper, though consumers of the metal will naturally take another view of the matter. Copper was for so long a time depressed in price that many mines were compelled to close down, failing to make any profit. This was notably the case with some of the Arizona mines, which, though having advantages of good ore, and plenty of it, easy to work, had the disadvantage of long distance from market and high freight. In California also the production was restricted. Some of the Montana copper mines made very little money, notwithstanding their immense resources. When, however, the price began to go up, producing mines increased their yield, and mines that had been shut down were again started up. The copper industry has not for many years been in so good a condition.

New York advices are to the effect that a gentleman thoroughly conversant with the copper market is reported as saying that the story that an agent of the French copper ring is trying in London to induce the Spanish copper companies to keep down the output of copper for four years is probably true. Some time ago a syndicate tried to form a combination of the Rio Tinto, Mason & Barry and Harries companies to limit the production of copper. It was unsuccessful. The Anaconda people were willing to go in, but the Calumet and Hecla would not. The fire in the Calumet and Hecla mine has so diminished its output that the Anaconda people are said to be willing to join the combination with the three great Spanish mines and help keep down production during the next two or three years. It is known that the latter are ready and will be satisfied if the Anaconda joins them.

## The Marshall Monument.

The Marshall Monument Committee, after a long delay, have at last got to work. Placerville Parlor of the Native Sons of the Golden West purchased the land, so there is now a place on which to erect the monument to the discoverer of gold in California. The statement is made that the sister of the man to whom the monument is to be erected had to be paid for the land on which it is to be placed, she having come into possession as his heir. If this is a fact it is a most remarkable instance of meanness. It is the desire of the commissioners to spend the entire Legislative appropriation of \$5000 on the monument alone. It is to be made of stone from a quarry near the spot. The commissioners invite stone-cutters, granite workers and monument builders to send in plans and specifications for a monument, the cost of which must not exceed \$5000.

The \$5000 remains intact, and will so remain until it is paid out to the individual who erects the monument. Plans and specifications should be addressed to the secretary, J. H. Miller, care of the Record-Union office, Sacramento. They will be received up to and including January 21st.

WOODBURN'S SILVER-COINAGE BILL.—Congressman Woodburn of Nevada has introduced a bill amending the Act of 1875 and authorizing the Secretary of the Treasury to coin 4,000,000 silver dollars per month, instead of 2,000,000, as at present. He says the volume of the circulating medium does not keep pace with the increase of population, and the necessity for more money is well understood by a sufficient number of Representatives to enable the bill to secure a majority of votes. He is the more certain of this inasmuch as the bill of last winter favoring absolute free coinage was only defeated by 35 votes.

THERE are four great accumulated masses of gold in the world—\$282,000,000 in the United States treasury, \$237,000,000 in the National bank of France, \$107,000,000 in the National bank of Germany, and \$100,000,000 in the Bank of England.

AT San Bernardino there has been incorporated a company representing \$2,000,000 capital, which proposes to erect at Chino smelters adapted to the successful reduction of all metallic ores produced in San Bernardino county.



Production of Precious Metals.

John J. Valentines, vice president and general manager Wells, Fargo & Co., has kindly furnished us with the following statement of precious metals produced in 1887 :

The following is a copy of our annual statement of precious metals produced in the States and Territories west of the Missouri river (including British Columbia and receipts by express from the West Coast States of Mexico) during 1887, which shows aggregate products as follows : Gold, \$33,074,022; silver, \$51,578,118; copper, \$10,362,746; lead, \$9,631,073; total gross result, \$104,645,959.

As stated repeatedly, the facilities afforded for the transportation of bullion, ores and base metals, by the extension of railroads into mining districts, increase the difficulty of verifying the reports of the products from several important localities. Especially is this the case in the reports from Colorado and Montana. The general tendency is to exaggeration when the actual values are not obtainable from authentic sources; but the aggregate result, as shown herein, we think may be relied on with reasonable confidence as approximately correct.

Annual Products of Lead, Copper, Silver and Gold in the States and Territories West of the Missouri River, 1870-1887.

Year.	Product as per W. F. & Co.'s statement, including British Columbia and west coast of Mexico.	Product after deducting amount from British Columbia and west coast of Mexico.
1870	\$24,000,000	\$22,150,000
1871	68,251,000	65,751,000
1872	11,250,000	10,000,000
1873	72,258,000	70,750,000
1874	74,400,000	71,400,000
1875	82,880,000	79,700,000
1876	90,875,000	87,200,000
1877	88,421,754	85,811,582
1878	81,134,622	78,276,107
1879	53,491,001	51,853,888
1880	84,300,000	82,000,000
1881	84,300,000	82,000,000
1882	92,411,885	89,207,549
1883	90,818,612	88,630,312
1884	84,975,054	81,693,585
1885	103,151,299	100,109,222
1886	104,645,959	103,357,170

444,907. Total, \$43,006,618, as against \$44,034,590 last year. Pounds sterling estimated at \$4.84.

Mr. Valentine also furnishes a statement of the product of gold and silver in the Republic of Mexico from 1877 to 1887, the aggregates for the period being as follows:

Gold.....	\$ 9,613,000
Silver.....	293,527,000
Total.....	\$308,045,000

The coinage of the republic from July 1, 1873, to June 30, 1887, was as follows:

Gold.....	\$ 8,945,749
Silver.....	323,883,608
Copper.....	203,296
Total.....	\$332,132,653

There is also the following interesting exhibit by epochs of the coinage of Mexico from the establishment of the mints in 1537 to the end of the fiscal year of 1887:

Colonial Epoch.	Totals.
Unmilled coin from 1537 to 1731.....	\$760,765,406
Pillar coin, 1732 to 1771.....	461,618,225
Bust coin, 1772 to 1821.....	939,298,329

Grand total.....\$2,151,581,000

The above total comprises \$68,778,411 in gold, \$2,082,260,656 in silver, and \$542,893 in copper.

Independence.	Totals.
Iturbide's Imperial bust, from 1822-3.....	\$19,132,061
Republic eagle, 1824 to June 30, 1873.....	790,622,290

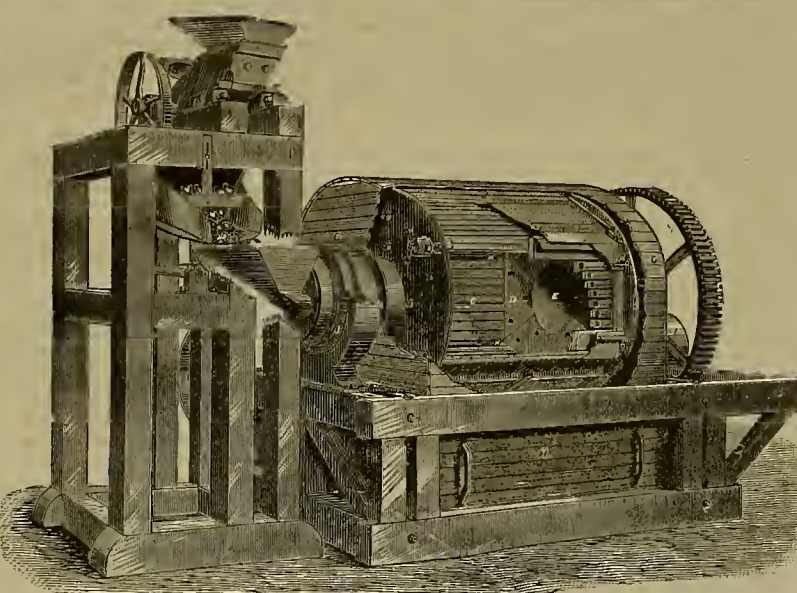
Grand total.....\$809,655,251

During this period the gold coinage was \$45,598,020; silver, \$758,822,054; and copper, \$5,235,177.

Republic.	Total.
Eagle coin, from July 1, 1873, to June 30, 1887.....	\$332,132,653

SUMMARY.

Colonial Epoch—From 1537 to 1821, \$2,151,



THE DODGE IMPROVED PULVERIZER.

\$81.60; Independence, from 1822 to 1873, \$809,655,251; Republic, from 1873 to 1887, \$332,132,653. Total, \$3,293,369,864.

The exhibits of production and mintage indicate a steady development of the mining interests of the United States of America, and also of Mexico, and with the increasing facilities of railway communication fostering every department of industry, the outlook for a continued growth in the product of precious metals is flattering.

RAE'S ELECTRIC SYSTEM.—Dr. J. H. Rae writes us from Virginia, Nev., that they started the electric system at 10 A. M. last Saturday in Mackay's pan-mills, and it is operating satisfactorily. They think they can see an improvement in the settlers, but will not be positive concerning the amount saved until the cleanup on the lot prox. The system is working to Dr. Rae's entire satisfaction.

DURING last week 950 tons of ore were shipped by the Cons. California and Virginia mine to the Morgan mill, 1342 tons to the Eureka mill, and 1100 tons to the California mill. The assay value of all the ore worked at the above mills during the week, according to battery samples, was \$34 70. Over \$130,000 in bullion is on hand and \$77,393 was shipped.

THE product of the Gypsum mine in Northern California, which was recently sold to an English syndicate for \$150,000, will be transported by rail over 200 miles to Benicia, where extensive calcining works are to be built.

ALL the mortgages on property in San Francisco aggregated but \$1 in ten of the total value of property. No other city in the Union makes a better showing.

The Lick Observatory Astronomers.

The Board of Regents of the University of California met on Tuesday last. The special committee appointed to consider the resolution accepting the resignation of Edward S. Holden as president of the University and resolutions appointing the director of and the astronomers in the Lick Observatory, and resolutions appointing a secretary and librarian and also a machinist, a laborer and a janitor, reported through A. L. Rhodes.

The resolutions were taken up seriatim and adopted after considerable discussion and many amendments. The resolutions, as adopted, are as follows:

That the resignation of Edward S. Holden as president of the University be accepted.

That Edward S. Holden be, and he hereby is, appointed as director and astronomer of the Lick Observatory, subject to the control of the Board of Regents.

That S. W. Burnham, A. M., he, and he hereby is, appointed as astronomer, with a salary of \$3000 per annum. That J. M. Schaeherle, A. M., he, and hereby is, appointed astronomer with a salary of \$2000 per annum.

That J. E. Kessler, A. B., he, and he hereby is, appointed astronomer with a salary of \$1400 per annum.

That E. E. Barnard be appointed astronomer at \$1200 per annum.

That the following be appointed: John McDonald, machinist, \$700 per annum; Chris McGuire, laborer, \$720, and Charles Harcourt, janitor, \$720.

That a secretary and librarian be appointed. That a committee of three Regents be ap-

The Dodge Improved Pulverizer.

The engraving on this page represents the improved form of the Dodge ore pulverizer, with rock-breaker, Challengers ore-feeder, etc. The changes suggested by experience have been made in this mill since it was first used by its inventor.

The principle of this mill is that of a hexagonal drum or barrel as shown, into which the ore is fed at J through the ore-feeder after having passed through the rock-breaker. This barrel is lined inside with steel bars, G, which form a grating through which the crushed ore passes on to the screens, the fine ore passing through on to copper plates if crushing wet, or into an elevator if crushing dry, while the coarser particles return to the barrel for further grinding. The barrel being hexagonal in shape, the ore does not slide in mass as in cylindrical pulverizers but falls over at each angle, thus insuring effective crushing. Common white pig iron, broken into pieces about 10 inches long, is used for crushing, or large pieces of hard quartz may be used for this purpose.

Two sizes of this mill are made. The No. 1 machine is 4 feet diameter and 4 feet long, requires 12-horse power to drive it, and has a capacity of 25 tons in 24 hours through a 40-mesh screen. This machine has a screen surface of 31 square feet; tight and loose pulleys, 30-inch diameter, 8-inch face, making 155 revolutions per minute, which gives 25 revolutions per minute on the mill; weight, about 18,000 pounds. The No. 2 machine is 3 feet diameter and 3 feet long, requires 8-horse power to drive it, and has a capacity of 10 tons in 24 hours through a 40-mesh screen. This machine has a screen surface of 17½ square feet; tight and loose pulleys, 20-inch diameter, 8-inch face, making 160 revolutions per minute, which gives 32 revolutions per minute on the mill; weight, about 8000 pounds. As will be seen, a Challenge ore-feeder on a special frame has over it a rock-breaker with a hopper, so that when ore is dumped into the hopper it is broken and properly fed to the mill. Under the mill is a dust-bin, H, for use when crushing dry. These machines are now built by Parke & Lacy of this city.

Foundry Notes.

The new hoisting works for a coal mine in Washington Territory, which are being built at the Golden State and Miners' Iron Works, in this city, are nearly completed. They will be about as large as any ever made on this coast. The engines are very powerful, and the whole machinery is of the greatest strength and perfection.

The Fulton Iron Works now have in their shops some 12 marine engines for use in coasting vessels. The auxiliary steam schooners built here of late have been profitable, making quick passages at small expense. So great has been their success that others are being built. The Fulton Works have made most of the engines.

Irving M. Scott of the Union Iron Works says with regard to the new Cruiser No. 5 that all the contracts have been executed. He says: "I have bought a lot of material for her—in fact all that we shall need in her construction, of all classes and kinds. I bought the hull plates from Andrew Carnegie of Pittsburgh, the shafts from the Bethlehem Steel Co.'s shop, and the steel casts from the Pacific Rolling-Mills, and as soon as the various plates reach here, the business of laying them will begin.

Fletcher Wilson, engineer in charge of Cruiser No. 5, was sent out by Secretary Whitney to inspect the machinery, and he will be here two years. The hull will be inspected by F. L. Fernold, who is already here, and the steel for the new cruiser will be inspected by Lieutenant Gilmore. It will probably take two years to finish the vessel.

"Secretary Whitney I found to be a good business man, intelligent, fair and just in his decisions, and anxious to give to the United States a navy equal to any. He is a strong friend of California, and believes in the future of the Pacific Coast and the whole country.

"We will rush the work through on the new cruiser just as fast as possible, employing a large force of men."

There is said to be a big demand for South Riverside coal.

The gross yield for 1887, shown above, segregated, is approximately as follows:

	Per cent.	Amount
Gold.....	31.61	\$32,074,022
Silver.....	49.23	51,578,118
Copper.....	9.91	10,362,746
Lead.....	9.20	9,631,073
Total.....		\$104,645,959

The exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, \$23,861,805; from Marseilles, \$4,699,906; from San Francisco, \$14,



## MECHANICAL PROGRESS.

## The Improvements in Machine Tools.

During a recent inspection of a modern machine shop, I was deeply impressed by the radical changes and improvements in the machinery and the methods of to-day as compared with those used in the shops 20 or more years ago. The progress in the system, organization and processes of manufacturing machinery has no doubt been as rapid as in any other branch of industry. And why not? To the mechanic, especially to the machinist and milling engineer, largely belongs the duty of inventing and developing the improvements of all classes of machinery, and surely they would not be consistent if they neglected those machines with which they come in daily contact and which are used in the production of all other machinery for every purpose. It has been said that lathes, planers and drills have not been changed or improved much in the last 20 years. They who make such statements have evidently not been close students or they did not have to do with the machine tools of the earlier days.

About 22 years ago I started my apprenticeship in the largest and best machine shop in a city of 60,000 inhabitants, and I well remember this class of tools I served my time with; lathes of all descriptions with wood frames, light iron ways, chain feeds, cast-iron headstock and tailstock, spindles of small diameter, fine pitch, narrow face, back gears, narrow-held cones, skeleton tool posts and such. There were a few lathes in the shop built of "all iron and steel" that were not much better than their wood-frame neighbors, either in appearance, strength, utility, or accuracy of workmanship and production. Still fewer lathes we had that would cut threads, and none that would cut a large square-thread cider press screw and nut that agreed.

As for planers, they were not much better. There was one planer about 28 inches wide by 10 feet long, the first one ever used in this city, and I guess it weighed about 4000 pounds. It would plane every way except parallel, straight and square. The crank planer was on a par with the times when it was made, and might have had power to take a respectable cut on metal. If it had, no one ever demonstrated the fact. One large drill-press had its table drilled off and a substitute was made from a portion of a heavy oak plank, which warped to a beautiful dish pattern when this big cylinder stove was first fired up in the cold weather. Its spindle would drop nearly one-half an inch when going through the hole, and as a matter of course the blacksmith was kept busy redressing flat drills. Another small drill-press was built to set on the ordinary machinist bench, but "the powers that were" set it up on a pair of (saw) horses in the middle of the floor to make it more accessible for work and other things. They succeeded beyond their most sanguine hopes, for it was the most accessible tool I ever saw for anything but work. The horses served for every large casting to be set up and braced against. Castings large and small were thrown under them. Old broken castings, scrap iron, pieces of so-called drills, chips, waste and all other kinds of dirt common to the general jobbing machine-shop found shelter under and around the protecting wings or legs of this drill-press. Some readers may think this an exaggerated description, but I can assure them that I was considered fortunate in securing an opportunity of learning my trade in the best-equipped shop in town, and there were several of them.

The same general brief description of machine tools will also serve for a large majority of shops throughout the country at that period. Now all these things are changed, and such scenes as described are rare—in fact in the minority. Lathes are common that will cut accurate threads of all shapes, sizes and leads, except fractional threads. They will bore straight, true holes, and turn true cylindrical work. They have plenty of "all iron and steel" in their construction, and are well proportioned with large, stiff steel spindles, strong back gears and generous cone belts. They show large ways for the carriage to travel on. The carriages have ample bearing surfaces. Lead screws are larger, stronger, and, as a rule, coarser in pitch. Reverse or frog-gearing is stronger and better arranged.

Planers have been subjected to the same improving process as well as drill-presses and other machines. In addition to all this they have been improved by having new features added to them for the convenience of operators, as well as for facilitating and perfecting work. But it is in the field of special tools and appliances for the rapid production of better work that the machinist's plant has been most improved, and to which I at the outset intended to confine myself most particularly; but it would take more than one article to tell these things, even in a brief manner. One of the most trying jobs that the machinist of "ye olden time" had to do was to bore out holes with the ordinary hook tool. They had to be bored through short hubs, through long hubs, through hard and soft hubs, through habbit, brass, cast and wrought iron, and still they had to be bored large and small, have heavy cuts and light cuts, and in and through all kinds of cased holes chuck full of sand fresh from the foundry. Generally there are about six hook-headed tools in the shop, and five men were

using the best of them as each came to select them in his turn.

Old-fashioned boring machines were not built right for good results, and an honest every-day mechanic could not possibly produce a fair day's work under such conditions, and it made him tired of the old, shaky lathe, wooden crossbar chuck and slender boring tool.

All these things are changed now for those who want to have them changed. Nice new chucking machines, both horizontal and upright, can be had now with good chucks, self-feeds and turret, with four or more bores for cutters and reamers to bore and finish holes and even face hubs without taking out or changing a hole. They will make thousands of holes alike and will probably produce more work in one day with a smart boy than the old method aided by a good mechanic would in a week. One machine of this class would keep the whole force of an average shop of 50 men busy finishing up what is outside of the holes they bore. They cost less for tools, attendance and operation than the three or four lathes used for the same work. They cost less for tools which last infinitely longer, take less room and save the cost of the three men on the lathes. There are shops that think, whether rightly or wrongly, that their business or capacity would not warrant such an investment, and they would naturally prefer to have something better than the ordinary boring tool.—*Cor. Dominion Mechanic.*

## Mechanical Suggestions.

To build a machine too well is to build it ill. He who should make a mowing machine in which the class of workmanship and the character of the finish was that found on a high-class machine tool, would score not only a commercial but a practical failure.

Free fits and no fits at all are the salvation of many machines.

It may be accepted as axiomatic that if a machine is to go into rough hands, it must be a rough machine; and the refinement possible in workmanship is exactly proportionate to the mechanical knowledge and skill of those who are to use it.

When there is any doubt as to the character of the workmanship in any particular case, it is better to err in the direction of over-refinement.

Use that which best accomplishes your purpose, even if some pronounce it "unmechanical," for that is the best in mechanism which accomplishes a given result in the most direct and effective manner.

Methods are of little consequence, except as means of reaching an end, and the value of a result as a result is independent of the method by which it is obtained.

The expressions "mechanical" and "unmechanical," as usually applied, have reference simply to the correspondence or non-correspondence of the method or device in question with our preconceived notions of fitness— notions usually based on prejudice, the outgrowth of ignorance and custom.

**COMPARATIVE MOTIVE FORCE OF DIFFERENT NATIONALITIES.**—From a note published by the Bureau of Statistics in Berlin the following very interesting figures are taken: Four-fifths of the engines now working in the world have been constructed during the last 25 years. The force equivalent to the working steam engines represents in the United States 7,500,000-horse power, in England 7,000,000-horse power, in Germany 4,500,000, in France 3,000,000, in Austria, 1,500,000. In these the motive-power of the locomotives is not included, whose number in all the world amounts to 105,000, and represents a total of 3,000,000-horse power. Adding this amount to the other figures, we obtain the total of 46,000,000-horse power. France has 49,590 stationary and locomotive boilers, 7000 locomotives. Germany has 59,000 boilers, 10,000 locomotives; Austria 12,000 boilers and 2800 locomotives. The steam engines to-day represent in the world approximately the work of a thousand millions of men, or more than double the working population of the earth. Steam, therefore, has trebled man's working power, enabling him to economize his physical strength while attending to his intellectual development.

**THE FIRST AMERICAN EDGE TOOLS.**—The first American establishment for the exclusive manufacture of edged tools was founded by Samuel Collins, at Collinsville, Conn., about 1826, when the product of a day's labor was the forging and tempering of eight broadaxes. With the modern appliances for such work, many times that number can be turned out in a day.

**THE METALS OF THE ANCIENTS.**—The ancients were acquainted with seven metals which they exposed to possess certain mystic relationship with the planets, and were represented by the hieroglyphics by which the planets were known. Gold was called Sol or sun; silver, Luna or moon; iron, Mars; lead, Saturn; copper, Venus; tin, Jupiter; mercury, Mercury.

**THE REASON WHY.**—An exchange says that a reason why steel will not weld as readily as wrought iron is that it is not partially composed of cinder, as seems to be the case with wrought iron, which assists in forming a fusible alloy with the scale of oxidation formed on the surface of the iron in the furnace.

## SCIENTIFIC PROGRESS.

## Philosophy of the Use of Oil on Rough Seas.

The stilling of waves by the use of oil was known to the ancients, is mentioned by Pliny, Plutarch and Aristotle, and allusion is made to it in the Scriptures. If there had been no potency in pouring oil on troubled waters, it is hardly probable that the saying would have become so well known, and been handed down from generation to generation.

The smooth sea or "alick" (to use a sailor phrase) always to the leeward of a dead whale, is vouched for by captains and whalers.

Question any old whaler and he will tell you it is a common occurrence, after fastening to a whale, for the elick caused by the oil from the whale to smooth the waves; while he knows the fact, he cannot give a lucid explanation of the reason of this tranquillizing effect of the oil on rough water.

The following theory has been put forward by one who has studied this matter quite thoroughly, and is worthy of attention: If a drop of oil is put on a highly polished marble table, or large plate glass that lies horizontally, the drop remains in place; spreads very little. But when put on water, it spreads instantly many feet around, becoming so thin as to produce the prismatic colors for a considerable space, and beyond them so much thinner as to be invisible.

It seems as if a natural repulsion between its particles took place as soon as it touched the water, and a repulsion so strong as to act upon other bodies swimming on the surface, as straw, leaves, chips, etc., forcing them to recede every way from the drop, as from a center, leaving a large clear space. There seems to be no repulsion between water and air to keep them from coming in contact with each other.

Air in motion or wind in passing over the smooth surface of water may rub it, as it were, upon the surface, and raise it in wrinkles, which, if the wind continues, are the elements of future waves.

If there be a mutual repulsion between the particles of oil, and no attraction between oil and water, oil dropped on water will not be held together; it will be at liberty to expand itself. The wind blowing over the water thus covered by a film of oil cannot easily catch upon it so as to raise the first wrinkles, but slides over it and leaves it smooth. It moves the oil a little, which, being between it and the water, seems to slide with and prevent friction.

When the wind blows fresh, there are continually rising on the back of every great wave a number of smaller ones, which roughen its surface and give the wind hold, as it were, to push it with greater force.

This hold is diminished by preventing the production of these smaller waves, and possibly, too, when a wave's surface is oiled, the wind in passing over it may rather in some degree press it down, and contribute to prevent its rising again, instead of promoting it.

This investigator's theory, to say the least, is a plausible one, and we feel bound to accept it till some one propounds a better one. The following suggestions are from the reports of the Hydrographic office, pamphlet 83:

A comparatively small amount of oil, say two quarts per hour, properly used, is sufficient to prevent any great damage to vessels and small boats in heavy seas. The greatest effect from oil is obtained in deep water.

In order to get the best effect from oil, it must be applied in such a way as to spread to the windward.

It is effective when scudding, when lying-to, when wearing, when lowering and hoisting boats in heavy seas. The best results seemed to be secured by pouring it into the bowls of water-closets where oakum has been placed, when it slowly leaks out.

It recommends in running before the wind, that canvas bags, capacity of two gallons, stuffed with oakum saturated with oil, be suspended by lanyards from each cat-head, and allowed to dangle in the water. In lying to, the weather-bow and mizzen-chains seem to be the best places for the bag, with lines long enough to allow them to tend to the windward while the ship drifts.

In crossing a bar on a flood-tide, some oil should be put overboard and allowed to float in ahead of the boat, which should follow with an oil-bag astern.

In crossing a bar on ebb-tide no advantage can be obtained by the use of oil. For hoarding a wreck, a vessel should run as close as possible under the lee of the wreck and put oil over. The wreck will drift down into the oil, when a boat can be sent alongside of her favorably. In case of a boat riding to a sea-anchor in heavy weather, the oil-bag should be secured to an endless line drove through a block at the sea-anchor, by means of which the oil is spread ahead of the boat, and when the bag is empty it can be hauled aboard and replenished.

These directions have been gathered from the experiences of those who have experimented with oil in high seas. S.

## Kite-Flying as a Science.

Among the boys of this country, the only object seems to be to get the kite into the air and enjoy the monotony of holding the string. They fly kites very different and for very different purposes in China and in India generally. There, boys, as well as men, spend the day in, as they manage it, a most exciting sport. An East Indian boy would laugh at the idea of flying a kite merely to see it in the air. A writer who has witnessed the sport describes the manufacture of the kite, and the manner of using it, as follows:

At the proper season, they go out for a day's sport, and fight kites in a way that would enrapture an American youth. They make a kite out of two sticks, one a straight, the other a bow-shaped piece of smooth wood, to which a common piece of paper is pasted. The tail is small, about in proportion and shaped like the tail of a bird. The string is carefully prepared by coating it with a paste made of varnish and finely powdered glass. It is then attached to the face of the kite, according to the angle at which it is desired to have it stand in the air. There is no running necessary to get the kite into the air, for it is set up by a series of jerks at the string. When as high as desired, the manipulator, by carefully jerking the string by which the kite executes a series of curves, moves it away from the direct force of the wind, and can in a circle of 360 degrees bring it 120 degrees to the right or left. Thus, by the position the kite has in the air, it is difficult to locate the place where the manipulator stands.

Now for the object of the glazed string. When there are several kites in the air, it is the desire of each manipulator to cut the strings of the others. He tries first to get his kite higher than that of his opponent, then to move it to the right or left to cross the other's string. When this has been accomplished he rewinds his string at a rapid rate. His kite turns round like a wheel and descends. His string, falling upon that of the other kite, cuts it like a saw. I have seen one of these East Indian kites put into this air so as to stand directly overhead, parallel with the earth.

## The Action of Magnets on Liquids.

Mr. S. T. Morehead of Lee University, Lexington, Va., in a communication to the *Journal of Science*, says: "Some weeks ago one of my students, Mr. J. C. Child, and myself were working with a diamagnetic instrument, repeating well-known experiments. Plank's method of observing the diamagnetism of liquids having failed in our hands to give satisfactory results, we hit upon a method which was new to us and which was very satisfactory. Into a glass tube of about four or five millimeters internal diameter, a small quantity of liquid was introduced forming a short cylinder. This tube was placed horizontally at right angles to the line joining the poles of the magnet, with the liquid nearly between the poles. When the current was turned on, the liquid was very evidently repelled. Water was repelled through a distance of about half a centimeter; wood spirit, through a greater distance. By moving the tube in the direction of its length, the wood spirit could be pushed any distance through the tube. The amount of motion is, of course, a function of the resistances due to adhesion and friction as well as of the repulsive force. The attraction of liquids is easily shown by the same method.

"A single modification of this above plan of proceeding is to incline the tube slightly so as to make the liquid flow toward the poles. If the required velocity be not too great, the magnet acts as a brake to stop the motion. It is well to bend the tube up a little at each end to prevent the liquids from flowing out. This method is well adapted for projection so as to be seen by large audiences."

**SPECIFIC HEAT.**—The specific heat of any substance is a term used to express the quantity of heat required to raise one pound of the substance one degree in temperature. Water has the greatest amount of specific heat of any substance, and is taken as the unit by which all other substances are measured. Thus a table of specific heat will give water, 1.00; cast iron, 0.14; wrought iron, 0.11; lead, 0.03, etc., which means that the quantity of heat that is required to raise one pound of water one degree in temperature would raise eleven pounds of cast iron or nine pounds of wrought iron, or 33 pounds of lead the same amount. The specific heat of substances is not exactly the same at all temperatures, but rises slightly as the temperature increases. The measure is taken from distilled water raised from 39° to 40°. This quantity is denominated a unit of heat.

**THE OLDEST BOTANICAL WORK.**—The great temple of Karnak at Thebes, in Egypt, contains the oldest botanical work in the world. It is sculptured on the walls of the temple, and represents foreign plants brought home by Thotmea III, from a campaign in Arabia. Not only is the plant or tree shown, but the leaves, fruit, and seed-pods are illustrated separately, after the fashion of modern botanists.

SAVANTS have discovered that the hair of the prong-horned antelope, like that of man, is made to stand erect by sudden fright. Investigation in this line might take in the hedgehog and ridge-pole cat.



## ENGINEERING NOTES.

## Great Ditching Scheme in Illinois.

There has heretofore been a marsh of some 200,000 acres in extent on the west side of Mason county, Illinois, which lies along the Illinois river, that stream making the western boundary. This marsh, since the settlement of the State, has been great duck and other game hunting-ground, though considerable of a nuisance to the farmers living on its borders. This marsh has recently been drained by the Mason County Ditch Co., consisting of the farmers owning the adjoining lands and the outside proprietors of the marshlands. The main ditch is 60 feet wide at top, 40 feet at bottom and 8 feet deep. It is 15 miles long, has a fall of 4 feet to the mile, and drains with its laterals, which are 30 feet wide at top, 15 at bottom, and with a depth to correspond with the main, from 200,000 to 300,000 acres. The cost of the whole is estimated to be \$200,000. The earth removed is sand and clay mixed, and offers little resistance to the machinery. The dredge doing the work floats in the water of the ditch and makes 100 feet progress every day. The assessed cost on some of the drained land will ultimately amount to \$25 per acre, and thence grading down to a trivial sum.

The work has been in progress for several years, and meantime the land drained has produced surprising crops of wheat and corn. The past year—a year of severe drouth—matters have not progressed as favorably in respect to crops, thousands of acres of corn having been lost by “firing” in consequence of the sudden withdrawal of the usual moisture. The thoughtful among the projectors of the scheme and owners of the land are now aware that they have made a mistake in not providing for holding a portion of the water, and recognize the fact that the ditch is twice the dimensions it should have been. If it were not for the fall—4 feet to the mile—a few locks or dams would hold the water when it will be needed for crops; but now it will take many.

THE GREAT GERMAN CANAL, which is to connect the North sea with the Baltic, the work of which was inaugurated with great ceremony in June last, is not a mere individual enterprise. It is a State undertaking, for strategic purposes. It will be also the realization of a very old project which was first proposed more than 500 years ago. The canal itself, which will be a clear cut from sea to sea, will have locks at both ends, with tide-gates to insure communication at any hour and under any condition of tides or temporary currents. In addition to its value for naval purposes, it will likewise prove of immense commercial advantage. At the point decided on for work, the Danish isthmus is 61 miles across, and the canal will save a circuit of nearly 600 miles. English commerce out of Hull, or out of places to the north of that port, will gain little from this canal, but the trade going to the Baltic by way of London or the south of England will save 240 miles. It is expected that tonnage to the collective amount of five and a half million tons will pass through the new canal yearly. This will mean half the tonnage now proceeding to the Baltic from English, French, German or Dutch ports. Whether these bright anticipations will be realized depends, of course, upon the practice of ship-owners when the canal is constructed. The canal will be a little over 60 yards wide and eight yards deep, which, it is claimed, will give ample room for two large mercantile vessels to pass each other, so that the delay which is now caused in the Suez canal from want of water-way will be avoided.

AN EXPENSIVE SEWAGE SYSTEM FOR SAN DIEGO.—The rapidly increasing population of San Diego calls for a thorough and extensive system of sewage. Accordingly a plan has been devised, somewhat novel in character and which will cost about \$400,000. The contract has been awarded to Col. Waring. The main sewer runs a quarter of a mile into the harbor to an outlet reservoir constructed alongside the deep-ship channels. The reservoir will have an area of one acre, and cost some \$50,000. The collected sewage will fill this reservoir not more than 1½ foot deep. High tide will add 3½ feet of sea-water to the mass. The contents thus diluted will be discharged into the outgoing tide by automatic gates opening an hour after high tide, and closing an hour before low tide. Col. Waring will also be employed to construct similar works for Stockton and Sacramento, where the conditions are nearly identical with those at San Diego. Col. Waring will make wells in various flat parts of those cities, connecting with a deep outlet well by large siphons. It is stated that Col. Waring has employed this plan for two years successfully at Norfolk, Virginia.

STARTLING FIGURES.—The water falling over Niagara has a power of 100,000 tons per hour moving through 150 feet. This force is equal to the consumption of 260,000,000 tons of coal, the amount annually burned by the entire population of the world. If one-half the fuel burned is used in driving machinery, then the power of Niagara would drive all the machinery in the world, with 50 per cent to lose in transmitting.

## USEFUL INFORMATION.

## Extent of the Wood-Working Interest.

The great extent of the wood-working interest, and its intimate relations to almost all other manufacturing interests, makes the conduct of a strictly wood working journal no trivial matter. By far the largest division of the wood-working industry is that directly or indirectly comprising the building trades proper. Except in the larger cities the majority of buildings, comprising dwellings, factories, mills, barns, shops and church edifices, are still constructed of wood, and thus the great army of builders are actually wood-workers. It is estimated that the amount expended in the erection and finishing of dwellings alone, yearly, throughout the country, is nearly \$800,000,000. This amount exceeds that expended in any other branch of the wood-working industry.

A large proportion of the wood-working machinery manufactured is intended for the use of those engaged in the building trades and in the preparation of building material. It is true that under the modern division of labor the manufacture of many building materials, comprising doors, sash, blinds, moldings, etc., has come to be an almost distinct industry, yet the master-builders almost always supply themselves with regular shops, fitted up with the most approved wood-working machinery for planing and matching their flooring, making their frames and casings for doors, windows, etc., and are, in fact, actual wood-workers, almost as much so as the manufacturers of sash, doors and blinds. They use much of the same machinery, and thus form the connecting link between the great building trades and the exclusive wood-workers, and requiring recognition of those trades in the hands of the intelligent and comprehensive wood-workers' journal.

Agricultural implement manufacturers, carriage and wagon manufacturers, bridge-builders, and many others, are also wood-workers, and require a variety of good working machinery, though the modern division of labor is every year taking more of the direct wood-working out of their hands. We have large establishments devoted to the exclusive manufacture of average and wagon wood-work, hubs, spokes, wheels, carriage bodies, handles, etc.; still there are a few carriage, wagon or agricultural implement factories that are not supplied with ample wood-working machinery. Railway and street-car works comprise another class of manufacturers who, though not classed as direct wood-workers, have to be supplied with ample and most improved wood-working machinery. Thus these industries are brought within the scope of the wood-working industry.

Furniture manufacturers are about the only exclusive wood-workers. They do not provide the material for other manufacturers, but complete their goods ready for the consumer. They require the most varied and perfect wood-working machinery, and much of the ingenuity of inventors, designers, and manufacturers of such machinery has been devoted to the requirements of furniture manufacturers. The ornamentation of furniture of the present day is carried to a greater extent than ever before, and has called for the manufacture of some of the most ingenious and elaborate machinery. And this demand for furniture ornamentation has given rise to a new branch of the wood-working industry, devoted exclusively to the manufacture of ornaments, which are furnished in a multitude of designs ready made, to the hand of the furniture-maker.

It will thus be seen that the scope of the wood-working industry is co-extensive with a very large number of important and far-reaching industries, and embraces by far the larger portion of mechanical occupations of the day. Indeed, it may be said to extend from the sawmill that cuts the rough lumber, from the log, to the shop that turns out the most delicate and elaborate ornaments for beautifying the most costly furniture; but it goes back of the sawmill to the axe that fells the trees in the forest, for that depends upon the wood-working establishment that manufactures the handle or helve. —The Woodworker.

THE SOUTHERN GUM TREE, says an exchange, has been experimented with in the matter of drying, and studied more than any other kind of wood, and out of many we have never had but one sample that stood the test. Samples of ordinary air-dried gum lumber that knoweth not how to warp have been promised, but they have not come to light. There is a way, practiced by a few, of sawing lumber thick to start with, and when dry, resawing it; but this is a roundabout way of getting at the desired results, although the one who does it thinks it pays. The sample to which we referred, that acted like a “white man,” was dried by the Noyes process. It has now been lying around for several months, but it is as plumb as the day it was brought into the office.

A DOMESTICATED BUFFALO HERD.—William Corbin of Weatherford, Texas, recently furnished the following interesting information to a newspaper reporter: “A sale recently took place on the border-line between Texas and New Mexico, which was remarkable for the fact that it carried with it the last remnant of the great southern buffalo herd. A ranchman, whose name I cannot recall, had on his range

200 head, which he had carefully preserved and guarded in every way. They have increased in numbers, and there are probably 300 now. He recently sold out and they have passed into other hands. It is hoped that the present owner will pursue the same course as the former, as, with the exception of a small herd in the far north, the buffalo on this range are the only ones outside the zoological gardens. It would be more profitable than raising cattle, and for this reason I believe this remnant will be shielded from destruction.”

IRON BRICKS.—Louis Jochim of Ottweiler, near Saarbrücken, Germany, is introducing paving blocks which he calls “iron bricks.” They are made by mixing equal parts of finely ground red argillaceous slate and finely ground clay and adding five per cent of iron ore. This mixture is moistened with a solution of 25 per cent of sulphate of iron, to which fine iron ore is added until it shows a consistency of 38° Balmé. It is then shaped in a press, dried, dipped once more in a nearly concentrated solution of finely ground iron ore, and then baked in an oven for 48 hours in a reducing flame. It is said that the German Government Testing Laboratory has reported favorably in regard to this new paving material.

PAPER WINDOW GLASS is one of the newest inventions. A window-pane is made of white paper, cloth or linen, and modified by chemical action. Afterward the paper is dipped in a preparation of camphor and alcohol which makes it like parchment. From this point it can be molded and cut into remarkably tough sheets, entirely translucent, and it can be dyed with almost the whole of the aniline colors, the result being a translucent sheet, showing far more vivid hues than the best glass exhibits.

MORTAR CONTAINING SUGAR has been employed in building the new Natural History Museum in Berlin, and has proved far superior to common mortar. It sets almost with the firmness of a good cement, while mortar made with molasses became soft and brittle after a time. In Madras, a mortar is used with which either sugar, butter or buttermilk, shellac and eggs are mixed. It holds well and takes a marble-like polish.

TIMING HORSES BY MEANS OF PHOTOGRAPHY.—A shrewd Yankee has invented an apparatus for timing horses. A clock with three hands—minute, second and quarter-second—is started by the official timer. When the winning horse touches the wire the clock is stopped by electricity. The same instant the current opens a camera, which photographs the horse and the clock face.

## GOOD HEALTH.

## Fatty Food.

A medical writer says: “The lumbermen in the Maine forests do very hard work in the intense cold and snows of winter and in the icy water in the spring. To endure the severe labor and cold, they must have food to yield a great deal of heat and strength. Beans and fat pork are staple articles of diet with them, and are used in very large quantities. The beans supply protein to make up for the wear and tear of muscle, and they, and more especially the pork, are very rich in energy to be used for warmth and work.”

“The use of oily and fatty foods in arctic regions is explained by the great potential energy of fat, a pound of which is equal to over two pounds of protein or starch. I have been greatly surprised to see, on looking into the matter, how commonly and largely the fatty kinds of meats are used by men engaged in very hard labor. Men in training for athletic contests, as oarsmen and football teams, eat large quantities of meat. I have often queried why so much fat beef is used, and especially why mutton is often recommended in preference to beef for training diet. Both the beef and mutton are rich in protein, which makes muscle. Mutton has the advantage of containing more fat along with the protein, and hence more potential energy. Perhaps this is another case in which experience has led to practice, the real grounds for which have later been explained by scientific research.”

## For Smallpox or Scarlet Fever.

One who was connected with the medical and surgical departments during the late war says: “Between the battles of Stone River and Missionary Ridge a smallpox epidemic scared more than it killed. A large hospital was established at Bridgeport, Ala., and the average number of inmates was represented by more than three figures. But the deaths were very few and the treatment quite simple. We only gave the patients plenty of ventilation by raising the sides of the large hospital tents, kept their bowels freely open, and gave them good rations of English ale, a commodity that was generously supplied by the Christian Commission of the North and Uncle Sam's Commissary Department.

“I have here also in my pocketbook a distinguished physician's recipe for the smallpox, and I know it is good, but I will give it to you with his own comments.

“This recipe has been used to my knowl-

edge in hundreds of cases, and I know it will prevent or cure smallpox, though the pittings are filling. When Jenner discovered the cowpox in England, the world of science hurled an avalanche of fame upon his head, but when the most scientific school of medicine in the world—that of Paris—published this recipe as a panacea for smallpox, it passed unheeded. It is unfailing as fate, and conquers in every instance. It is harmless when taken by a well person. It will also cure scarlet fever. Here is the recipe as I have used it and cured my children of scarlet fever; here it is as I have used it to cure smallpox:

“Sulphate of zinc, one grain; foxglove (digitalis), one grain; half a teaspoonful of sugar; mix with two teaspoonfuls of water. When thoroughly mixed, add four ounces of water. Take a spoonful every hour. Either disease will disappear in 12 hours. For a child, smaller doses, according to age. If counties would counsel their physicians to use this, there would be no need of pesthouses. If you value advice and experience, use this for that terrible disease.”

## Infants and Nicotine.

The Santa Rosa City Council, at its regular meeting January 3d, instructed the city attorney to draft an ordinance making it a misdemeanor to sell cigarettes to boys under 16 years of age, and also for boys under that age to smoke cigarettes. But such an ordinance, to be of any practical worth, should include cigars and tobacco in any form.

In reference to this matter the S. F. Chronicle observes: It is no uncommon thing nowadays to see children scarcely out of dresses puffing at a cigarette with all the nonchalance imaginable; and such cigarettes, too, as they generally are. The babies' means are so limited that they can buy nothing but the cheapest and vilest kinds of cigarettes, such as no man who knows anything about tobacco would look at, much less smoke; and with these indescribably nasty concoctions these youngsters proceed to poison themselves. The example of Santa Rosa is one that might be followed to advantage by other cities, San Francisco included. We make all sorts of health regulations; we enforce vaccination and prescribe how much air sleeping-rooms shall contain; we take care of the children's work-time, lest they be stunted and crushed before they have grown strong; we get up societies with long names to see that tiny acrobats do not turn one bandspiring too many, while at the same time we permit those same children to buy poison on every corner and to kill themselves by inches, and no one interferes. San Francisco should adopt an ordinance similar to that of Santa Rosa, and then see that it is enforced.

LITTLE THINGS THAT KILL.—At various times the newspapers have warned the public against swallowing the seeds of grapes, oranges, etc., because of the danger of such substances getting into a small intestinal bag, or cul-de-sac, called by doctors the appendix vermiciformis. This is a receptacle formed at the junction of the large and small intestines, but its use or object no physician knows. It has been thought to be a rudimentary or incomplete formation—or possibly some meaningless survival of a lost anterior type. At any rate, its existence, while presenting no apparent “reason for being,” as the French say, is, on the other hand, a positive and constant source of danger, because of the liability of its becoming the receptacle of some undigested seed or other indigestible substance. In that case it produces a state of inflammation, which, in nearly all cases, proves fatal. Fortunately, but few seeds among the great number so heedlessly swallowed seem to get into this little death-trap—although any one seems likely to lodge there. Perhaps more cases of inflammation of the bowels than the doctors suspect may be, in reality, due to this obscure and disregarded cause. One sad case which to-day produces a feeling of deep regret among thousands, and which plunges a family into overwhelming grief, occurred in this city on Saturday evening, in the lamented death of J. Robert Dwyer, the much-esteemed adjutant of the Governor's foot-guard—a man whose place that corps cannot make good. His case so baffled the physicians that an autopsy was had, and that revealed a piece of peanut shell in the appendix vermiciformis.—Hartford Times.

POISON FROM THE HUMAN TEETH.—The poison conveyed by the human teeth is one of the most annoying that a physician ever has to deal with, writes Dr. A. C. Robinson. A bitten ear or a nose is months in healing, where a more important wound inflicted by an instrument would readily yield to simple remedies. I have under my attention severe and most complicated cases of blood-poisoning, in which the patient had but slightly abraded the band in the course of a fight by striking his knuckle against the teeth of his opponent. I have known hands thus poisoned only saved from amputation by the application of all the resources of science. Tobacco or whisky, or dia-arrangement of the stomach for many other causes, may be responsible for this poisonous condition of the teeth, and I am not prepared to say that a man with good health and a clean, sweet mouth would convey this poison, but I can only speak of the frequency of this class of cases and the difficulty of attending them successfully.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**SUTTER CREEK.**—Cor. Amador Ledger, Jan. 7: The Wildman mill is running like clockwork. The mechanics had not completed their work more than a few hours when heavy rains set in, furnishing plenty of water for all purposes. The pressure at this mill is no doubt the best in the county, requiring but very little water to run the mill and hoisting works. Nearly all the ore which was on the dump has been crushed, and the miners are now extracting rock from the lower levels. I am told on good authority that the result of the mill's operations so far is quite satisfactory. The four men who leased the Lincoln mine from Mr. Stewart commenced work last Monday, and expect to have the mill running in a few days. Word has reached here that the Mahoney will positively start up in good shape in the spring.

**BUNKER HILL.**—The miners commenced work again at the Bunker Hill last Tuesday morning. The mill is running all the stamps, so that everything is in operation as before the fire. I understand that hereafter the changing-house for the men will be a separate building from the engine-house, so there will be less danger of burning all the works down should a fire take place in the changing-house. The work of taking the water out of the Talisman shaft commenced this week. There is only one shift on at present, but just as soon as everything is in good running order, two shifts will be put on and work commenced in earnest. Everything is run by water-power, taking water from the pipe that supplies the South Spring Hill mill.

**PLYMOUTH.**—The rains have made an abundance of water to start the mining and milling, so that the outlook for plenty of water this season is very good. Lamb and Wickern are opening up their claim on the Ocher lead. Lawrence Evans is running his mill on the sand that runs down from the Plymouth Con. mines.

## Calaveras.

**COPPERPOLIS.**—Cor. Angels Record, Jan. 5: I was present at the Union copper mine, and I saw a large iron bucket of copper ore raised from the bowels of the earth, the first one for about 20 years from this particular mine. About seven months ago, the owners put on a force of men to clear the mine of water, repair the machinery and buildings, and generally fit up the plant for business; and finally at the opening of this year, the first specimen of copper ore is on exhibition, and the population of this neighborhood shows a lively interest in the future of this mammoth enterprise. This same mine has produced vast results heretofore, and already it has distributed a very large sum of money for its wants. I have obtained no reliable information as to the plans of the company hereafter, but judging from the extensive preparations made so far, and considering the price of copper, it might easily be conjectured that copper will be taken out as fast as possible. As to the extent of the ore and its richness, we may probably rely upon the past history of the mine. The number of men now employed on all kinds of work may not exceed 20, but rumor has it that the taking out of ore will commence in earnest, and when this commodity is deposited under the sheds the blocks must be broken up and the best selected for reduction or smelting.

**MURPHYS.**—Cor. Calaveras Prospect, Jan. 6: Mining in its various branches only awaits a sufficient water supply to start the industry into increased activity in this and adjoining districts. McCormick, Bisber & Thomas will commence piping in their Central Hill gravel mine as soon as they can get sufficient water. They will put a big blast to break the bank to accelerate the work in piping. The Oro Plata mill started up a few days ago on better quartz than has been taken out of the mine for some time. The plates show more free gold than ever before. Good progress is made in sinking the large working shaft, from which the fine quartz is now being hoisted to the surface. The shaft is down 55 feet from the 100-foot level. Tom Goodwin is pushing developments in the Stanislaus district with dispatch. The Leffel Turbine and rock-crusher for his mill on the river is now lying in Murphys for transportation to its destination. Other mines in this vicinity show marked improvement, and their owners are encouraged by the present prospects.

## El Dorado.

**CONFIDENCE.**—Placerville Observer, Jan. 10: The Confidence Kern mine, owned by John Fesper, John Fesper, Wm. Brown, Albert Rodemark and Cline, has an incline down 250 feet, from which a tunnel has been run 100 feet in a bed of gravel 3½ feet in depth. This gravel is of the nature of cement and pays by sluice-washing process, \$2.50 per carload, which is about one-third of what it contains. For the proper working of this material, a mill is necessary.

**QUARTZ.**—The contractors at the Bonanza mine, Balic district, have struck 15 inches of quartz in five feet of soft vein matter, which is considered by mining men to be very favorable.

**LAST CHANCE.**—Thomas Botts, Andy O'Neill and Chas. M. Henson are opening up the Last Chance mine on Webber Hill. This mine yielded largely in olden times, but from the old works the lower part of the channel could not be reached. The tunnel now being driven will drain the entire channel, and good results are confidently expected.

## Fresno.

**GRUB GULCH.**—Expositor, Jan. 4: The Grub Gulch mines are 14 miles above Raymond on the turnpike road leading to the Yosemite valley. This is fast becoming a thriving town. The business establishments are doing extensive work. The Josephine Co. has just completed a 20-stamp mill which will soon commence crushing ore. The Gambetta mine is about one-half mile from the Josephine, and is running full blast. They are taking good ore out of the Red River. The Knob Hill mine has closed down for the present.

## Inyo.

**TO START THE MILL.**—Inyo Independent, Jan. 7: About 250 tons of ore is now gathered at the Riley

mill. There is also a large amount of wood and other necessary materials. Mr. Anthony intends starting up the mill immediately.

## Napa.

**QUICKSILVER SHIPMENTS.**—Calistogan, Jan. 4: During the past month the shipments of quicksilver from Calistoga have been unusually heavy, the advance in price having been an inducement for superintendents to mine their best ore and obtain as much of it as possible. The following figures show the output in flasks of the mines, as follows: Great Western mine, 147; Sulphur Bank, 203; Bradford's, 267; Napa Con. (Oat Hill), 330. The total amount is 947 flasks, or 71,972 pounds.

## Nevada.

**MINING WORK INTERRUPTED.**—Grass Valley Union, Jan. 10: Work is again interrupted in the mines of this district that use water-power for running their machinery. After repairs were made to the South Yuba canal last week, which supplies the water, the hard freezing weather came on, which greatly lessened the flow of water until there was not sufficient to drive all the machinery, and there will not be enough for several days, or until the weather has sufficiently moderated or the usual amount of water comes through the pipe lines. Yesterday, at the Idaho mine, there was only sufficient water to run the pumps—the mill being stopped and underground work suspended. At the Empire and North Star mines steam connection has been made for pumping, and milling and mining work for the present is suspended. The ice embargo is liable to be broken, however, at any hour, as word was received yesterday that 700 inches of water was coming down the canal, but it had not reached the reservoirs of the several companies as late as 4 o'clock P. M.

**MINERS AGAIN IDLE.**—Foothill Tidings, Jan. 7: But a few of the North Star miners went to work this morning, and they were obliged to return home at noon because of the failure of the water supply. The Empire and Brunswick are also short of water for hoisting purposes, and at the Idaho the supply is lacking 50 inches at this writing—3 o'clock P. M. Snow-slides along the line of the South Yuba ditch are no doubt responsible for the shortage. Should the Idaho nor receive its full measure very quickly the miners will again be laid off, as the reservoir reserve will be required to keep the pumps running, and must not be utilized to any extent for other purposes for fear of a prolonged blockade of the main ditch.

**THE UNION.**—Nevada Transcript, Jan. 6: A cleanup recently made at George A. Nibell & Co.'s Union quartz mine on Banner mountain gave most gratifying results. The owners of this mine have displayed a nerve and energy in pushing its development that justly entitles them to a rich reward, and they are now in a fair way to get it.

**WATER.**—Foothill Tidings, Jan. 10: Several mines in Nevada district have been partially filled by surface water. Contractors on the 1200-foot level of the Providence mine have been compelled to discontinue work until the water is lowered by pumping. The San Jose Drift Mining Company of Washington township has purchased of the locators the northeasterly extension of their mine. The purchase consists of 40 acres and lies between the original San Jose and the Centennial claim.

**THE GRANT.**—North San Juan Times, Jan. 6: The above mine only ran a few days during last month and the result of the run is not yet known here, but the Grant's owners feel satisfied that the cleanup will meet their most sanguine anticipation. The storm since the close of the old year has prevented travel to and from the mine. The last heard from there was on Christmas day, and then the rock was paying big.

**DIVIDEND.**—The cleanup at the Delhi in December paid a dividend of \$70,000 and left a few thousands on hand for a nest-egg. The entire cleanup approximated closely upon \$17,000. The Delhi still keeps up its reputation as being first-class.

**MINE FLOODED.**—Foothill Tidings, Jan. 5: Surface water in large quantities got into the shaft of the East Eureka mine on Sunday night or Monday. The pump was started up Monday night and by running it steadily until this afternoon "the bal was forked." This shaft is now down about 200 feet and the indications are splendid for a good ledge within a short distance.

## Placer.

**SPRING GARDEN DISTRICT.**—Cor. Placer Argus, Jan. 7: I have noticed the many reports of the mines on this "divide," but there is one section which I think has been somewhat neglected by our county press; that is the Spring Garden Mining District on the lower portion of the Forest Hill Divide. The rapidly increasing interest which is being taken in that section by enterprising and experienced mining men both here and below, would indicate that they are thoroughly convinced that the same deep channel, which is an established fact from Red Point, above Damascus, all the way down the Ridge to the May Flower and Excelsior mines, continues its course down the ridge through the Dardanelles, Mountain Tunnel, Old Centennial, Grey Eagle, Spring Garden and Blue Gravel mines, and probably has its outlet into the Middle Fork Canyon near the latter. This theory would seem to be still further strengthened by the fact that of all the shafts which have been sunk in that section, notably the Mountain Tunnel, Centennial, Grey Eagle, Spring Garden and Blue Gravel, although they have attained depths of 100 to 240 feet, not one has ever yet reached the bottom of the channel, for wherever they have sunk into the bedrock it has been found to be "pitching off," indicating greater depth. All the above mines, however, with the exception of the Grey Eagle, were under the control of men or companies, either lacking the necessary wealth, experience, or courage, and faith. But the Grey Eagle bids fair to solve the problem of the richness of the channel in that section. It is between the property known as the Spring Garden ranch and Owl creek. The company have erected suitable buildings, within sight of the Auburn and Forest Hill stage-road, and at a point which (by surface indications and shaft sunk to the "rim-rock" on either side) they conceive to be directly over the deepest part of the channel. Here they are sinking a shaft which has already attained a depth of 175 feet. The water which has been encountered in sinking and which is always considered a good indication in gravel mines, is raised to the surface by means of a fine double-cyl-

der steam pump. The dirt is at present raised by horse-power, but I hear this will soon be supplanted by a steam hoisting engine which will facilitate operations in general. The Grey Eagle is in active operation, but it is reported that a large and powerful company represented by two of our local mining men have obtained control of the Blue Gravel mine and adjacent properties and will soon begin the excavation of a large tunnel to tap all their ground. The strike in the Dardanelles has also accelerated the interest in the "lower divide," so that now there is scarcely a foot of available ground which has not been secured for mining purposes—that is, around Owl creek, Spring Garden and Paradise—and even farther down the divide where it is known that no gravel deposits exist. A great many quartz claims have been located. From this it will be observed that the lower portion of Forest Hill Divide is not only deserving of notice but that present prospects indicate a bright and prosperous future.

**PURCHASED.**—Placer Republican, Jan. 7: The Big Oak Tree mine at Colfax was purchased last month by S. D. Valentine of San Francisco, who immediately made a contract with M. C. Taylor and W. C. D. Body of Grass Valley, to put up new hoisting works and machinery. The contract amounted to \$3250, and the work is almost completed. The machinery consists of a boiler, engine, pump, etc., and the contractors will finish their work in about three weeks. It will require about four weeks more to pump out the shaft, which is 190 feet deep on the ledge and nearly full of water. When the water is out, Mr. Valentine will sink 100 feet more on the ledge before he begins to crush. It is probable that a new mill will be erected. The Big Oak Tree, the Rising Sun, and the railroad company are at present tangled up in a manner more complicated than interesting, and when the litigation is once settled and the Big Oak is got under way there is no doubt that it will prove to be a handsome property. Some of the ore has proved to be very rich.

**NEW PROJECT.**—A new mining project is under way at Todds Valley. A company consisting of John Farrier, Thomas Harper, Anthony Clark, and others have begun the work of extending the old Union Tunnel which is located two miles below the town and was originally intended to tap the main channel of Todds Valley. This tunnel was run 200 feet in early days at a cost of about \$60 a foot. The present company is driving it ahead now for the main lead, and they expect to strike the channel in about 250 feet just below the old Natchez tunnel, which paid well in early days.

## Shasta.

**NEW LEDGE.**—Shasta Free Press, Jan. 7: Gainey and some others have struck a rich and extensive ledge on Clear creek. It was discovered in the following manner: He and his party, who were out prospecting, came across two Germans, placer mining, and in conversation with them discovered that they were perfectly ignorant concerning quartz, and that during their travels they had found what they call "a streak of white-looking rock," about 100 yards up the hill from where they were working. They immediately hunted that streak and found what they consider one of the richest ledges ever discovered in that section. It was located at once, and they are now developing it. At the head of Dog Creek gulch, Bard, Hunter & Co., Trinity county men, are making some surprising developments. At Delta, Frank Klemenstein is about to enlarge his hotel by butting a 20x60 wing to it and raising the whole building another story. Alex Bergman was down from Squaw creek on Wednesday, and from him we learn that the Croesus mine had to shut down their mill in consequence of the water freezing and bursting a pipe, but that the mine was still developing richly. In the old Carson & Snyder mine, now Conant & Hendy's, they have struck a good ledge in the lower tunnel. A contract has been let by them for 130 feet, and they expect some rich developments before it is completed. A mill will be erected in the spring. The Conant mine is as good as ever, and they are still turning out their regular bullion. Considerable prospecting has been done in our vicinity during the past rainy days of this week, and within the sound of the planing-mill whistle; as much as ten cents to the pan has been washed out. Some coarse gold has also been found, and some of our mechanics have made good wages during the time the wet weather kept them from their regular work. Parties are very reticent concerning the location of their finds, as they wish to preserve them for rainy days.

## Sierra.

**TUNNEL.**—Mountain Messenger, Jan. 7: J. P. Kuder & Co. are running a tunnel ahead near Good-year Bar into a flat that has never been thoroughly prospected. The tunnel was run in early times in bedrock and was long since abandoned. Mr. Kuder's company are raising in the tunnel and he thinks the indications are favorable for a channel that has heretofore been unexplored. The Young America Co. has struck the ledge 800 feet below the present workings, with their lower tunnel. This will necessarily advance the value of their stock. F. J. Hauber has been here this week from Alleghany, and reports mining news as follows: The Rainbow Co. are operating in their mine, and run a Burleigh drill. The original tunnel was in 2000 feet, and missed the ledge. Now they have branched off at 1600 feet, to the right, and struck the Rainbow ledge, which is five feet wide and prospects well. The company are highly elated. Rich quartz was struck a few days ago in the Downieville, better known as the Old Sailor ledge, owned by Thos. Bessler. Friday morning snow was seven feet deep at the Young America quartz-mill, over 6000 feet above the sea, same altitude as Howland Flat and Lake Tahoe.

**THE ALASKA.**—North San Juan Times, Jan. 6: A workman in this mine reported here the present week that a gold vein had been struck which yielded solid pieces of gold. He said sackfuls of pieces had been taken out last week in which quartz was the exception. The Alaska is proving itself to be a wonderful mine in richness, and but for the cost of mining it would be ranked among the best-paying mines yet discovered on the Pacific Coast.

## Trinity.

**EAST FORK.**—Cor. Trinity Journal: The East Fork district now bids fair to become, in the near future, one of the principal mining districts in the county—located as it is near the center of the county,

easy of access, within a few miles of wagon-roads on either side. That a wagon-road is one of the indispensable necessities to the successful working and developing of the district is self-evident to all. East Fork to-day is of more importance to Weaverly and the central part of the county than the other three principal camps all put together. Deadwood, Bullychoop and New River are all so located that their trade, travel, money and business generally go directly the other way out of the county.

**DRIVEN OFF BY SNOW.**—Mr. F. J. Perkins, who has been prospecting the Yellowstone mine in the East Fork district for W. T. Coleman, was in town this week. Owing to the heavy fall of snow, work has been suspended on the mine till spring. The mine looks well.

## Tulare.

**NICKEL.**—Tulare Times, Jan. 4: Five months ago there was published in the Times an article descriptive of the mineral resources of Tulare county. We then predicted that in the near future discoveries would be made which would place our county in the front rank as a mining county. On the old Bacon ranch 10 miles northeast of this city, a discovery has been made recently which proves beyond a doubt that nickel exists there, we hope, in paying quantities.

## NEVADA.

## Washoe District.

**BEST AND BELCHER.**—Virginia Enterprise, Jan. 7: On the 425 level west crosscut No. 2 has been extended 15 feet; total, 289 feet. The formation is hard birdseye porphyry. East crosscut No. 3, north of the south line, has been advanced 22 feet. No work has been done in the main north drift during the week. On the 1300 level west crosscut No. 2, opposite east crosscut No. 1, has been advanced 45 feet. On the 1500 level, through the 1300 level winze connection, all movable matter has been recovered, and work has been suspended at this point.

**HALE AND NORCROSS.**—On the 400 level the west drift has been advanced 40 feet. Most of this distance is in a body of fine-looking quartz, giving fair assays. On the 700 level the ore development shows continual and steady improvement. In the north upraise they are now up seven sets vertically, all the way in fine ore. The north upraise is advanced 49 feet, the last 300 feet of which is all high-grade ore. From the top of this upraise have drifted 45 feet north in good ore and have connected with the south drift leading from the north upraise. On account of severe weather have not been able to ship the usual quantity of ore to the Vivian mill. Have bullion on hand from this mill which with previous receipts amounts to \$45,000.

**SAVAGE.**—Since last reports the north drift on the 400 level has been advanced 100 feet, and the south drift 67 feet. On the 500 level the upraise has been extended 67 feet. On the 600 level the main south drift was extended 60 feet. Have not extracted the usual quantity of ore, owing at first to the scarcity of water and since to the freezing weather and later to the interruption of communication occasioned by the recent severe storms. From present appearances we anticipate no further trouble from either of these sources. We have bullion on hand for the month amounting to \$52,000.

**BELCHER.**—West crosscut No. 2, 400 level, is now in 45 feet. The face is in porphyry, showing streaks of low-grade quartz. The 400 level south drift is in 175 feet south of the line. The face is in about the same material as reported last week. Have started south also from the 500 level south drift of the Crown Point for the purpose of upraising in Belcher ground on this level. Have advanced it 27 feet. Suture tunnel drift is out 1115 feet. A considerable portion of the week was occupied in timbering.

**CROWN POINT.**—The 500 level west crosscut is now in 117 feet. The ground in the face is composed of soft porphyry and quartz in streaks, and about 1½ inches of water is running from it. About striking the ledge for which this drift is run, the distance to go depends on the dip of the ledge, and it may be either 15 or 25 feet further off. The ground they are now cutting is identically of the same character as that cut 15 or 20 feet east of the ledge found on the 400 level.

**CON. CAL. AND VIRGINIA.**—On the 1300 level the east drift from the south drift still continues to show streaks and bunches of good ore. On the 1435 level the winze in crosscut No. 2 still shows ore of high grade. The usual amount of ore has been shipped to the Morgan and Eureka mills on the Carson river and to the California mill in this city. The average assay value of the ore shipped will be about the same as last week.

**OCCIDENTAL.**—No. 2 upraise, 74 feet north of the north incline winze, has been carried up 12 feet; total raise, 29 feet. Four tons of ore from this raise has been stored in the dump. On the 48 level have extracted 48 tons of ore. The ore extracted from the 100 and 200 levels has been held in the mine, as the dump at the lower tunnel is full.

**GOULD AND CURRY.**—On the 250 level east crosscut No. 2 has been extended 16 feet; total length, 30 feet. The formation is porphyry, clay and quartz. From the top of the upraise in the east crosscut the east drift has been extended 9 feet; total length, 37 feet. The face is in clay showing some water.

**EXCHEQUEUR.**—The west crosscut on the 122 level is making good progress in favorable material, and No. 2 east crosscut on the same level is out 67 feet. Good progress is making in the northeast crosscut on the 222 level; also in sinking the shaft.

**BALTIMORE.**—The water is being handled without trouble and will soon be so far reduced as to allow of prospecting the ore deposits found some time ago. The ore cut on the 300 level promises to be of quite as much importance as that below.

**JUSTICE.**—A considerable amount of good milling ore is still in sight on the 600 level. There are on the dump at the mine over 1200 tons of ore ready to be worked when milling facilities can be obtained.

**ANDES.**—The west drift from the north drift, on the 240 level, is in vein porphyry of a favorable appearance. The west drift on the 350 level is in a fine quality of quartz which carries some ore.

**ALTA.**—Are working on the 725 and 825 levels; also are at work in the winze between the two levels.



Owing to the deep snow and freezing weather the mill has not been run for a few days past.

**SEGREGATED BELCHER.**—The south drift from the 1300 level raise is in 25 feet in low-grade quartz. As soon as this drift is in 30 or 40 feet further a west crosscut will be started from it.

**YELLOW JACKET.**—Are extracting and shipping 300 tons of ore a day. The ore is being taken out from between the 1100 and 1400 levels. The dump-ground at the mine is being extended.

**OPHIR.**—The winze below the 1300 level is still yielding the usual amount of good ore. The several prospecting drifts and winzes in other parts are being pushed forward as usual.

**SCORPION.**—On the 300 level the south drift is advanced 43 feet and the north drift 54 feet. Work was interrupted for a few days by the recent snowstorms.

**CUOLLAR.**—The main incline is down a little over 300 feet. On the 650, 550, 450 and 350 levels the several drifts are all making good progress.

**MEXICAN.**—On the 1300 level the west crosscut from the north drift is in soft vein material, in which there is a predominance of clay.

**HAYWOOD.**—The body of ore recently struck in the winze 200 feet below the tunnel level still continues to look and assay well.

**BENTON.**—Are drifting at the usual points on the 725 and 800 levels. The material is a vein matter of a promising character.

**UNION CON.**—On the 1300 level west crosscut No. 1 continues in vein porphyry of a promising character.

**BULLION.**—The usual progress is making in sinking the shaft from the 300 to the 500 level.

**POTOSI.**—On the 950, 450 and 250 levels all work is progressing as usual.

**UTAH.**—The work of repairing the north drift still continues.

#### Tuscarora District.

**NAVAJO QUEEN.**—*Times-Review*, Jan. 7: Making fair headway sinking shaft; total depth sunk and timbered to date, 162 feet. Ground on side of shaft next to ledge getting harder.

**NEVADA QUEEN.**—100-foot level: North drift has been advanced 20 feet. South drift extended 9 feet in very hard rock. 200-foot level: The winze has been sunk 10 feet; total, 90 feet. Bottom still in fine ore. Sinking has been stopped until No. 3 crosscut is in, when an upraise will be put up to connect with the winze. 350-foot level: No. 3 east crosscut has been driven 25 feet, and has cut into the ledge about 10 feet, showing the same kind of ore as in the winze above. It improves as the crosscut advances toward the footwall.

**FOUND TREASURE.**—Crosscut, 200-foot level, has been extended 20 feet during the week; total length, 90 feet. Formation continues same as at last report. Have passed through gangway vein, and a drift, which is opening up some water, has been started on it in a southeasterly direction. On this level, as on the 150-foot, this vein carries some good ore. The old works have been cleared of water.

**COMMONWEALTH.**—Main shaft has been sunk and timbered 19 feet. Bottom in solid blasting rock. North drift, 100-foot level, has been extended 15 feet. The ore has increased in width going north, showing 3½ feet, and is much higher grade than any ever taken from this level. Quite a flow of water comes through the vein.

**PONDRE.**—Have put on night shift on north drift and east crosscut. The crosscut is expected to cut ledge No. 2 50 feet deeper than present workings.

**GRAND PRIZE.**—The south intermediate drift from winze No. 1, extended 11 feet; face showing very rich ore. Stopes are looking and yielding well, both as to grade of ore and quantity.

**NAVAJO.**—South drift, west vein, 350-foot level, extended 6 feet. West crosscut No. 2 from near the face of the above drift is 10 feet. The face of both shows favorable looking porphyry.

**NORTH BELLE ISLE.**—North gangway, 400-foot level, extended 12 feet. The rock in the face is harder, but looks favorable.

#### Wild Rose District.

**THE WILD GOOSE MINE.**—*Silver State*, Jan. 10: J. V. McCurdy, superintendent of the Paradise Valley mine, received a message from Foreman Soper this morning informing him that they struck the Wild Goose lead in the lowest level, 700 feet below the surface, last night. A vein of rich ore about 14 inches thick was cut in the lead. This is the most important mining news received from Paradise for some time.

**PARADISE VALLEY M. Co.**—Ore produced and delivered to the mill, 97,500 pounds. Average assay value in ounces per ton—silver 20.92, gold 0.17. Mill run 175 hours and lost 17 hours. Reduced 72 tons of ore and 35 tons of tailings. Produced 340 sacks of concentrates, 23,065 pounds, per value \$2772.78, which were shipped to the Boston & Colorado Smelting Co., Argo, Colorado.

**NOTES.**—The roads are nearly impassable for loaded teams, consequently we are behind in getting ore to the mill and forwarding concentrates. The 150 level is still improving and we now have about 16 inches of good milling ore at this point of development and a large block of unexplored ground.

#### ARIZONA.

**TURKEY CREEK DISTRICT.**—*Cor. Prescott Journal-Miner*, Jan. 6: Work on the mines in this district is progressing finely. There is more work being done at the present time than for several years past. If reports are true, a company will soon have a large force of men at work on one of our prominent gold mines. Several miners are taking out rich ore, and as soon as the roads are open will send tons of high-grade ore to the sampler. Among the many rich mines is the Holmes, which can ship steadily. Roche is also working his mine and has shipping ore on the dump ready for sacking. The old Goodwin mine has been leased to Chas. A. Girdler, and he has quite a force of men at work developing the property. He has timbered the old shaft, cleaned it out and sunk it deeper. He has also commenced the sinking of a working shaft about 200 feet south of the old shaft, and is now down 15

feet. Shaft No. 3, just started, is about 100 feet north of the old shaft. The new shafts are on the ledge, but do not show any ore, but the owner seems to have faith enough to sink 100 feet or more in hopes to strike the pay streak which is supposed to be in this ledge. The old shaft did not show any signs of ore when cleared of the debris, but the vein showing up strong, sinking was commenced, and to-day they have got a narrow streak of pay ore which looks well, and may widen out as depth is obtained. Capt. Brann is opening a mine on Pine Flat, and expects to have enough pay ore out inside of the next 60 days to start up the mill. It is also reported that the Morning Glory is to be opened and a large force of men put to work next month.

**RICH BLUE DICK.**—*Prescott Courier*, Dec. 29: We are in daily expectation of hearing that the United Verde mines and smelter have been sold to Mr. Farrell, who will work the mines in a proper way and run furnaces as they should be run. The Blue Dick mine, Haysampa district, is, as we say in the West, "keeping up its lick." The recent shipment consisted of 27,689 pounds (gross weight) of ore, which sampled as follows: Copper, four cents; silver, 300 ounces; gold, one-half ounce per ton. Jack McDonald, one of the lessees, says he could have selected two tons of the lot that would have sampled 1000 ounces to the ton. The Signal Co. are running ten stamps and eight concentrators. Ore warehouses and bins at the Prescott sampler are overflowing with ore. N. L. Griffin, the pioneer Arizona miner, is here from Walker district, feeling well on account of promising developments in the mines.

**GLOBE.**—*Silver Belt*, Jan. 7: In ten months, under the supervision of Dr. A. Trippel, the Globe mine rendered a net profit of \$82,000, with an average 16 per cent and refined copper at 10½ cents per pound, in New York. This result, in view of present advanced price of copper, is very encouraging for the future, and a cause of gratulation, not only to the owners of the mine, but also to residents of Globe, where the mine is situated.

**WEAVER DISTRICT.**—*Mohave Miner*, Jan. 7: From a gentleman in from the Weaver district we learn that the Southwestern Mining Co. have purchased the Potter mining claim adjoining the claims of that company and have put a force of men at work on that property. The mill which has been lying idle for some time will shortly start up. The Layne mine, owned by Messrs. Hamlin, Vanes & Logan, is now down 60 feet and is getting better with depth. Some high-grade ore has been taken out by the present owners, and they are satisfied that it will continue. Owing to the weather and the condition of the roads but little ore has been received at the sampling works. A single lot for the C. O. D. mine was worked.

#### COLORADO.

**STRIKES.**—*Georgetown Courier*, Jan. 5: We have heard of several promising strikes made while doing annual labor on lode claims hereabouts. This work is compulsory, but it shows that some would rather stand around and talk hard times than go to work willingly. If the assessment were larger more strikes would be made. From Mr. VanAiken we learn that during the past year a shaft was sunk 200 feet on the Norman lode, one drift driven 25 feet, two others fairly started, and about 40 feet of crosscutting done. The workings show a good vein of ore and preparations are making to commence stoping. Mr. Hall expects to have the power drills in place on his tunnel within 60 days. Work is now progressing at the rate of between 50 and 60 feet a month, but with the drills it is calculated to make 100 feet monthly. We understand from general report that Astor Alliance matters have been so arranged that a large working capital is forthcoming to open up the property.

**FRED ROGERS' MINE.**—The indications are that this mine, which has turned out about \$300,000 from the shaft workings, will, during the coming year, take its old place as one of the main mines in the county. From Mr. D. McArthur we learn that the mine has been undergoing steady development from the Bonanza tunnel during the past year, a drift having been driven west 200 feet, east 200 feet, and a raise of 169 feet completed to the shaft, which gives excellent ventilation. The ground between the west level and the surface—about 500 feet—has never been explored. Some very good ore was taken out in running the level, and undoubtedly large bodies of rich ore lie hidden above. Two shifts are employed on the level west, which will be driven into the ground of the Cedar Rapids claim, the end line of which is 150 feet ahead of the breast of the level.

**NO STATEMENT.**—The Georgetown sampling works have not yet made out their statements of the amount of ore handled in 1887, and it is not at all likely that producers who have sold their ores to other sampling works and to smelters will take the trouble to give their shipments for publication, hence it will be impossible to give a satisfactory statement of the output of this vicinity. Heretofore we have depended mainly upon the smelters' reports to approximate the output of the county. The only works that have reported are the Omaha and Grant. If the producers and purchasers refuse to give their statements, how in the name of common sense are the newspapers to get at the output?

**ANOTHER STRIKE.**—The new year has been showering blessing on the mining men in the way of opening up good bodies of ore. L. Cohen & Co. have got it now, and got it big in the Nabob lode, on Silver Creek. From three to six inches of high-grade ore in the roof, breast, and under foot is enough for any man's Christmas. Mr. Cohen is engaged quite extensively in mining, having leases on the Virginia City, Pay Rock, Corry City and Seven-Thirty mines. Altogether, his 1887 mining operations have netted him quite a sum of money.

**HIDDEN TREASURE UNHIDDEN.**—The strike on the Hidden Treasure, Lincoln mountain, by Messrs. Mears, Markey & Bauer, is the most important made in years if it holds out, and we are not juggling words when we make this statement. The strike is made in an adit 250 feet in on the lode and at a perpendicular depth of 150 feet. They went for silver and got gold; an inch streak in a 10-inch vein of hard quartz is fairly alive with gold.

**TOMTICHI VALLEY SHELTER.**—*Crested Butte Pilot*, Jan. 5: The Tomtichi Valley smelter during 1887 handled 10,000 tons of ore, which is about 27

tons per day, while the present capacity of the smelter is about 45 tons per day. From this ore the smelter shipped 390,000 ounces silver, 1,400 ounces gold and 1300 tons of lead. The most of the ore came from the San Juan country. While there was about 1200 tons of ore shipped from Crested Butte, only about 500 tons was received by this smelter, the rest going to Denver and elsewhere.

#### DAKOTA.

**MONARCH.**—In the east drift of the crosscut from the bottom of the Monarch shaft water has become so troublesome lately as to force a temporary discontinuance of operations therein, and the force has therefore been concentrated in the west drift. Before driven out, however, ore which will do to mill was encountered. Confidence is expressed that before the east drift shall be extended another 20 feet a large body of free-milling, paying gold ore will be encountered. Water is being rapidly drained, through natural outlets and constant use of the pump, and work will in a very few days be resumed here. Assessment work lately completed on the Addenda, a Bald Mountain claim belonging to John McVean, resulted in the uncovering of a ledge of very good ore containing gold and silver in paying quantities. Another carload of Retriever ore starts from the mine for Omaha to-day. The Royal Arch M. Co., owning several claims at Bald Mountain, has started a force to work upon its property. Developments will be pushed vigorously and continuously, as the corporation is a strong one.

#### IDAHO.

**GOLD-BEARING ORE.**—*Idaho Avalanche*, Jan. 1: We hear that Mr. W. F. Sommeccamp, Sr., has cut a lode of fine-paying ore with the crosscut being run to strike the St. Clair lode. The ore is gold-bearing. We congratulate him on his new find, which is probably a stringer of the St. Clair. The crosscut will not reach the St. Clair for some time yet, but from present indications he will strike a large body of rich ore in the latter mine.

**FLINT.**—Everything is running smoothly at Flint. Rich ore was struck in the Rising Star drift on Saturday night last, and the development of the same is now in progress.

**ALTON DISTRICT.**—*Cor. Idaho Statesman*, Dec. 31: The Alton mining district is in the east part of Idaho county, and the mines are about 25 miles southeast of Warren's, between the South and Middle forks of Salmon river. The immediate vicinity of these prospects is watered by Big creek, itself a considerable stream, and a branch of the Middle fork. There are also two forks of Big creek which run in a southeasterly direction and unite about 12 miles from the source. The mountain ridge between them has great bulk and elevation, and in and upon such ridge lie nearly all the locations that have been made. This ridge may be called truly a part of the backbone of the continent on account of its height—the north side being covered with perpetual snow. From the crest other mountains covered with snow may be seen to the north and south, but the country slopes into basins upon the east and west. The Cleopland was the first ledge discovered and located. Its course is about northeast and southwest. It is situated upon the east face of a steep mountain. The ore carries silver with a little gold and a great deal of iron and other base metals, and though not exactly rebellious is complex and expensive to treat. It will pass for high-grade ore anywhere. Much of it has assayed from \$60 to \$150 per ton, and it looks as if it would go that much. A hole has been sunk 25 feet or so, disclosing a fine body of ore. A tunnel was started for crosscutting and had not reached the vein when winter set in and put a stop to further work. On the same mountain is the Beck, Mountain View and perhaps two dozen other locations of which not much is visible but location stakes and monuments. The development work has been of the kind made by miners in haste to sell. Long experience has convinced me that the district will do to tie to. The ore is there and the vein looks strong.

#### NEW MEXICO.

**SWEETSTAKE.**—*Kingston Shaft*, Jan. 4: The Sweetstake mining claim on North Percha is looking better than at any time in its history, although in 1885, 27 men were employed upon it, and it paid expenses with coyote workings. Barr & Bosley have the claim bonded. This claim is about two miles east of the Templar and Keystone, and a mile north of the Solitaire, and has the Solitaire croppings. Col. Crawford informs us that he has 500 feet of track laid on the Enterprise mine. This looks like business.

**SMELETER.**—*Lordsburg Liberal*, Jan. 6: The smelter at Clifton is about completed. The Arizona Copper Co.'s capacity is 250 tons daily. The managers of the Aztec mine are well pleased with the showings it has made. A Georgetown prospector recently found a pocket from which he took 200 pounds of ore worth 100 per pound. Smith, Wyman & Kimball, the original locators of the Kimball district, at Stein's pass, have signed over all their mining properties in that district to the Beck Consolidated Mining Co., of which they hold most of the stock. Kansas City capitalists are looking at this property with the view of purchasing.

#### MONTANA.

**GENERAL ACTIVITY.**—*Butte Miner*, Jan. 1: During the severe cold weather the Old Lexington mill on the east side suspended operations for a time. At the Parrot No. 7, on North Wyoming street, arrangements are being made to start up. Such improvements as the present state of the weather will allow are being made at the Colusa smelter. Next summer will see Meaderville as lively as Butte, as the amount of work laid out in mines, smelters, etc., will give employment to many artisans and laborers. The old ore dump that has lain undisturbed so long at the Gray Eagle mine is being hauled to the smelter for reduction. Some trouble is being caused in the Basin district by parties surveying over ground of others and making applications for patents. There is uneasiness among many of the claimants in this city, and steps are being taken to frustrate the designs of the parties who are trying to get patents for more ground than belongs to them. The parties interested believe that there

will be quite a mining boom in Basin next summer, owing to the cheap transportation of ores assured by the new railroads. At the Chambers Syndicate group of mines everything progresses as usual. When the new Anaconda works are completed more miners will be employed, as at present but a limited quantity of ore can be disposed of. The Mountain View has about all its improvements completed except placing in position the new engine that is daily expected to arrive. The small engine that has been used in developing the property from the grassroots down to its present depth is still used for hoisting. A large number of miners is employed in enlarging the stations and running drifts, and when the large engine is in position, the work of hoisting ore will be actively and continuously carried on. Considerable ore is being produced and reduced at the works of the company at Meaderville. The large Cornish pump that has been placed in the bed of Silver Bow Creek at the Blue Bird mill is now in operation, supplying water to the works. At the Hope mine not long since there were probabilities of suspension, but the company has opened up a new body of ore in virgin ground that is equal in extent and richness to any previous strikes in the mine.

#### OREGON.

**SILVER CREEK MINES.**—*Bedrock Democrat*, Dec. 29: The California mine is turning out good ore. The Appomattox vein is at least 20 feet wide, not all rich ore, but it contains a pay streak or chute that is very rich and from which we are now taking ore, which we will ship, as we did that from the California, to Denver for reduction. We expect to make a shipment the latter part of February. We are now driving a tunnel that will cut the ledge at a depth of 75 feet. When we complete this tunnel we will have our mine in very good shape to work. The Eureka, the property of Jon. Bourne, Jr., of Portland and C. W. Knowles, is the best showing for amount of work done on any mine on the Pacific Coast. A tunnel cuts the ledge 200 feet below the surface, running parallel with the same, and the pay ore fills the full width of the tunnel, 4½ feet across. The ore will average \$25 or \$30 per ton, and there is any amount of it in sight. The company has between 250 and 300 tons of the ore on the dump, and they don't propose to ship away a pound of it, either, but intend in the spring to put \$75,000 worth of machinery on the property and do their own milling. The Eureka, as are the other mines I have spoken of, is in a slate formation, is easy of access, surrounded by an abundance of excellent timber and is close to as good water-power as one could desire. I could tell you of a dozen other prominent mines in the Silver Creek mining district, but don't care to take too much of your space at this time. I will only add that the success of our district is a certainty and that before many months we will have a boom, and one, too, of no small proportions.

#### WASHINGTON.

**RICH GOLD ORE.**—*Ellensburg Capital*, Dec. 24: From Andrew Munden, a practical miner who has been doing assessment work on the Shafer company's mines in the Peshastan district, the following facts are gleaned: In driving west upon the 120-foot level in the Humming Bird, a ten-inch vein of rich specimen ore has been struck. Handsome free gold specimens are obtained from the streak, which is steadily growing stronger and bids fair to develop into a big ore body. Peshastan miners are jubilant over the strike in the Humming Bird, as hitherto everybody appeared to be afraid to investigate the lower levels of the Peshastan camp. In the mines both east and west of the Humming Bird, better rock was in sight at close of the season than has been exposed in the camp for a long time. In the Henton Fraction (next east of the H. B.), 18 inches of rich free gold rock was opened out in driving west. This assures plenty of good ore in that claim, as also in the Humming Bird ground, which is thus far unbroken. In the Bob Tail claim on the west, four to five feet of rock that will yield \$25 and upward per ton in free gold is in sight. Farther up the mountain in the old Shafer ground, Donahue and Teets have a rich body of ore exposed. Both of the last named miners are building arrastras, one on Nigger creek and the other on the Peshastan. Next season quartz mining on this creek will be conducted with greater activity than ever before.

#### UTAH.

**ORE AT BINGHAM.**—*Salt Lake Tribune*, Jan. 8: The Brooklyn mine, Bingham, has 200 tons of ore piled up at the mine awaiting shipment, and 100 tons was on the market in this city yesterday, M. M. Kaighn goes to Bingham to day and will try to get more teams to haul ore. The reason of having 200 tons out ready for shipping is that teams could not be procured to take it to the railway at Revere. Snow is not deep enough about Bingham to give any trouble, and mining is going on steadily.

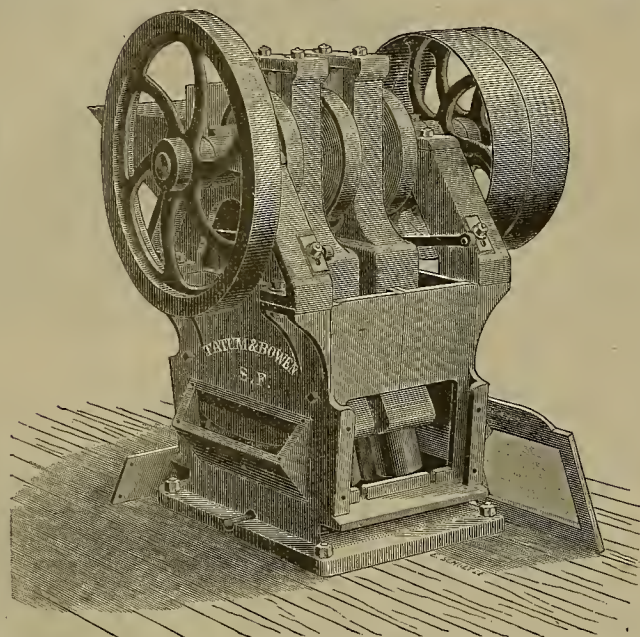
**SLIDE AT CENTENNIAL EUREKA.**—An Iron-ton dispatch to W. W. Chisholm yesterday, stated that a big snowslide had destroyed the bunk-house at the Centennial Eureka mine, but that no one was hurt. There have been plenty of snowslides in the gulch, but it was not remembered that any ever took that direction before. The mercury down there was 15 degrees below at 7 A. M., yesterday.

**BULLION SHIPMENTS.**—*Park Record*, Jan. 7: The bullion shipments for the past two weeks were as follows: Ontario, 46 bars, containing 25,291.14 fine ounces of silver, shipped on Dec. 31st. Another shipment will be made to-morrow. Daily bullion from the Marsac mill: Dec. 26th, 8 bars, 9166 ounces; 26th, 8 bars, 8958 ounces; Jan. 1st, 8 bars, 9390 ounces; 7th (to-day), 6 bars, containing 6598 fine ounces silver; total, 30 bars, 34,172 ounces. Owing to the bad condition of the roads, the ore shipments from the Ontario, Daly and Crescent were very light.

**THE COAL FINDS.**—Negotiations are pending, and which no doubt will soon be perfected, for the early development of the coal deposits lately discovered near Sunnyside. It is believed that there is anthracite coal there, and it is proposed to go far enough with drifts to fully test the extent and value, and for this purpose a good company will be formed, to be backed by ample capital for pushing the enterprise.



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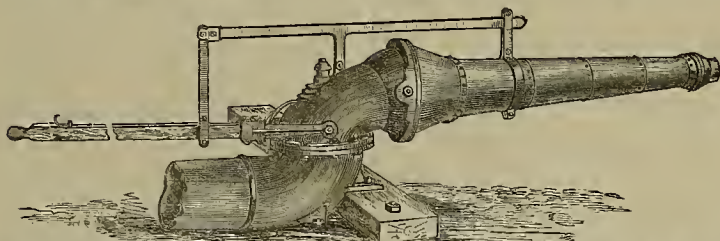
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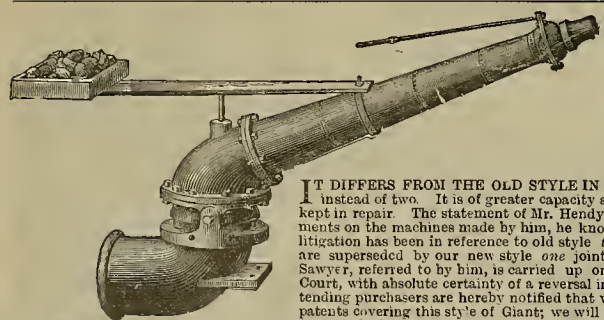


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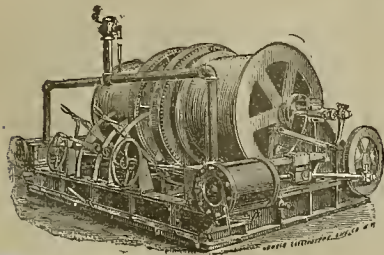
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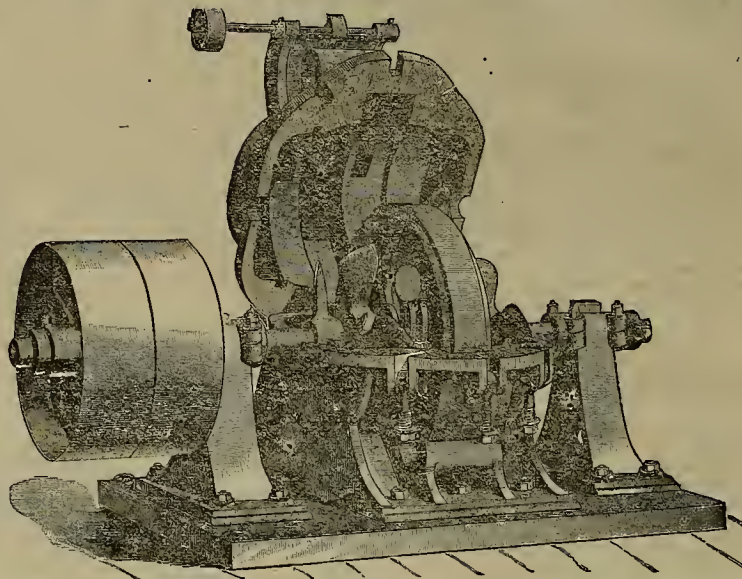
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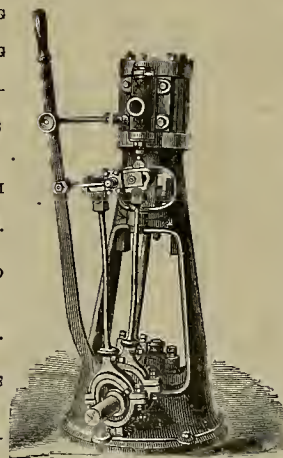
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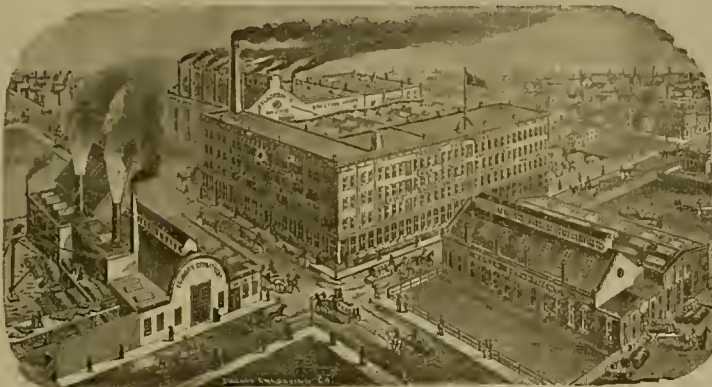
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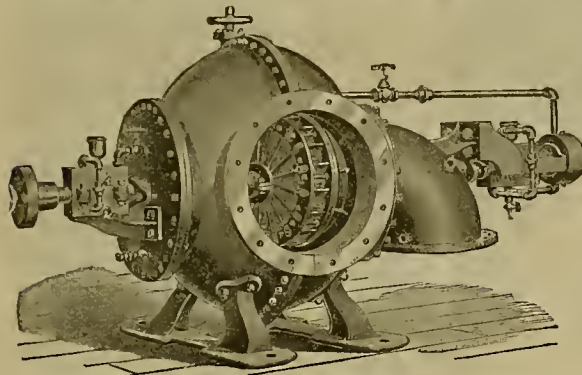
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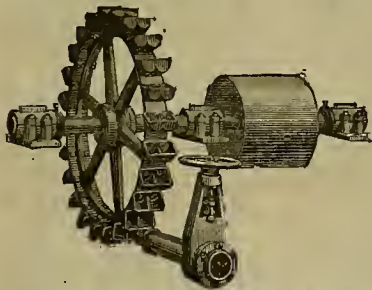
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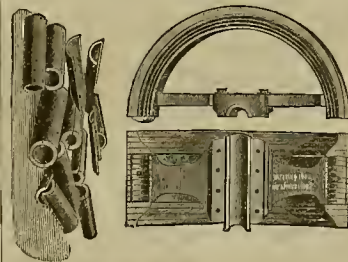
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## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING JANUARY 3, 1888.

- 376,022.—GRADING SCRAPER—L. E. Ashley, Stockton, Cal.  
 375,916.—CROSSCUT-SAW HANDLE—M. Bennett, Eureka, Cal.  
 375,795.—DEVICE FOR OBTAINING VERTICAL LINES—J. Beyerle, Vallejo, Cal.  
 375,800.—SAWMILL SET WORKS—W. A. Campbell, Portland, Ogn.  
 375,801.—SAWMILL STOCK ROLLER—W. A. Campbell, Portland, Ogn.  
 375,802.—SIDEHILL FLOW—Elisha Clark, Felton, Cal.  
 375,817.—BED-LOUNGE—John Hoey, S. F.  
 375,999.—CONCRETE PAVEMENTS—P. H. Jackson, S. F.  
 375,822.—ANIMAL TRAP—B. P. Jolly, Soledad, Cal.  
 375,940.—VEHICLE WHEEL—Walter Knight, San Andreas, Cal.  
 375,826.—WAGON-SPRING BRACE—F. H. Mason, Saucelito, Cal.  
 375,829.—PISTOL-HOLDER—R. Newman, S. F.  
 375,837.—PRESSURE REGULATOR—E. A. Scott, S. F.  
 375,899.—ROTARY WATER METER—S. L. Shufleton, Eureka, Cal.  
 375,779.—FIRE TRUCK AND LADDER—Smith & Mansfield, Oakland, Cal.  
 376,044.—GRAIN SCALE AND REGISTER—L. Reynolds, Yreka, Cal.  
 375,844.—SHOW-STAND—C. Toohy, S. F.  
 375,845.—TANNING—Wær, Phillips & Kengla, Tucson, A. T.  
 375,972.—DRESS CHART—Josephine S. Wilson, San Jose, Cal.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WAGON-SPRING BRACE.—Frank H. Mason, Saucelito, assignor of one-half to Geo. V. Kennedy. No. 375,826. Dated Jan. 3, 1888. This is an improvement in the braces of wagons by which the springs are kept in position. The spring brace is connected by a lever operated by the bed, so the brace is kept tight at all times. In the construction patented the brace is kept tight under all circumstances and will not rattle.

SIDE HILL FLOW AND ROAD-GRADER.—Elisha Clark, Felton, Santa Cruz Co. No. 375,802. Dated Jan. 3, 1888. This reversible plow may be also used as a road-grader. It consists of a plow-beam united to a land-side or shoe at the bottom by means of a vertical post or posts, and having the mold-board and plow-share supported in front of the post by a vertical shaft or spindle, about which it may turn to stand upon either side of the plow-beam, and with either point toward the front to correspond with the plow point, the latter being formed upon the stationary shoe.

BED-LOUNGE.—John Hoey, S. F. No. 375,817. Dated Jan. 3, 1888. This is a bed-lounge in which the back or other portions, such as the arm, is adapted to assume, when used as a sofa, an upright position, and when used as a seat a horizontal position in line with the seat portion. The invention consists of a new and useful device which acts as a support for the back or other portion when in an upright position, and as a leg therefor when it is in a horizontal position. The object of the invention is to provide a simple and effective support for holding the back or other folding portions upright and a leg for supporting it when thrown down to be used as a bed.

ANIMAL TRAP.—Bertie P. Jolly, Soledad, Monterey Co. No. 375,822. Dated Jan. 3, 1888. The trap is specially designed for go-phers and other hurrowing animals. It is one of those made of spring wire arms held in position by a trigger, which is operated automatically by the throwing of the earth against it. The invention consists in a single piece of spring wire, having its ends bent at an angle and curved in opposite directions through approximately 180 degrees, said ends crossing or interlocking, and in a trigger formed by a single piece of wire, the ends of which are bent at right angles, one end being provided with a notch for engaging one side of the main spring wire, and the other being broadened or flattened out to receive the impact of the earth. This trap is of very cheap and simple form.

SHOW-STAND.—Cornelius Toohy, S. F. No. 375,844. Dated Jan. 3, 1888. This is one of the class of stands or cases for containing goods for exhibition or show. It consists in an upright framework provided with vertical rows of parallel transverse bars or supports adapted to receive and support in a vertical series the cases, boxes or cases containing the material to be exhibited, and a supplementary transverse bar or support at the base of the frame forming the key of the series of superposed boxes,

cases or cases, which defines or determines their angle. The invention further consists, in combination with a frame of this character, of the cans, boxes or cases containing the material to be exhibited, and having an access door or lid on the back of the upper portion of each which may be operated when all the cases or boxes are in position without interfering with their place in the stand. The object is to provide a practical show-stand for such goods as crackers, teas and other materials usually contained in cans or boxes and without disturbing their primary adjustment in the frame, to be able to reach their contents without difficulty.

DEVICE FOR OBTAINING VERTICAL LINES.—Joseph Beyerle, Vallejo, assignor of one-half to W. F. Fountain, Oakland. No. 375,795. Dated Jan. 3, 1888. The principal use of this device is upon vessels and in places where the relative position or parallelism of one floor or deck to the one below must be determined. If a vessel is having the stanchions set between the decks, it is necessary to place them on what would be a vertical line with the keel, if the vessel was exactly on an even keel. This is rarely the case, however, whether the vessel is in the water or in a dock; but as the decks or beams have been originally put in at right angles with the keel and parallel with each other, it is easy to use these beams or decks as a base to which the device may be attached. Vertical lines can be obtained in any place where a plumb-bob cannot be applied, as on a vessel in motion. It may be employed to find the center of bed-plates or other machinery on board a vessel. It can also be used to make a survey in cities where it is impossible to bring the instrument directly over the line on account of walls and for many other purposes. The device has nothing to do with the tripod of any instrument, and only appears with it when used upon such instruments as are supported on tripods. It is used on shipboard without any tripod whatever. This device for finding a point which shall be in a line perpendicular to a table or surface, and passing through a given point thereon, consists of a plate attachable to said table or surface, a rotary shank or spindle pivoted with a universal joint to said table, and an extensible leg jointed to the spindle and provided with a locking screw by which it is fixed at any desired angle with said plate.

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department to, San Francisco:

DEL MONTE M. Co. Jan. 7. Location, Tuscarora, Nev. Capital stock, \$1,000,000. Directors—E. Scott, M. A. Jackson, J. W. Pew, J. F. Cassell and F. A. Berlin.

DICKMAN-JONES Co., Jan. 11. Object, to carry on the business of printing, publishing and lithographing. Capital stock, \$200,000. Directors—Charles J. Dickman, George Jones, Michael Hettrick, Frank C. Hornung and Louis Sloss Jr.

MONTREY EXTENSION R. R. Co., Jan. 7. Capital stock, \$25,000. Directors—Chas. Crocker, Chas. F. Crocker, Timothy Hopkins, W. V. Huntington and N. T. Smith.

NORTH COMMONWEALTH M. Co., Jan. 7. Location, Nev. Capital stock, \$1,000,000. Directors—E. Scott, M. A. Jackson, J. W. Pew, J. F. Cassell and F. A. Berlin.

PACIFIC WATER & LAND DEVELOPMENT CO., Jan. 8. Capital stock, \$2,000,000. Directors—G. H. Thompson, P. C. Rust, L. P. McCarthy, H. C. Stillwell and C. H. Ramsden.

PALERMO LAND AND WATER CO., Jan. 7. Capital stock, \$500,000. Directors—Henry Wise, D. W. McAfee, A. S. Baldwin, D. K. Perkins and George C. Perkins.

SAN DIEGO CABLE RAILWAY RIGHTS CO., Jan. 9. Capital stock, \$100,000. Directors—F. L. Castle, S. Steiner, J. M. Thompson, M. B. Keller and R. H. Young.

SIERRA LAKES ICE CO., Jan. 7. Capital stock, \$1,000,000. Directors—Moses Hopkins, E. W. Hopkins, C. A. Graw, J. Hoehn and Russell J. Wilson.

S. F. BOOT & SHOE MANUFACTURING CO., Jan. 8. Capital stock, \$25,000. Directors—J. N. Harrison, W. Martin, G. W. Lewis, R. H. Webster and Geo. F. Lamb.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Savage, Jan. 7, \$52,000; Hale and Norcross 7, \$45,000; Bluebird, 3, \$16,560; Moulton, 3, \$15,600; Cons. California and Virginia, 7, \$77,393; total for December, \$259,000; Savage, 7, \$52,000; Hale and Norcross, \$45,000; Moun- Diablo (for December) \$42,203; Eureka Con. 7, \$20,000; North Belle Isle, 7, \$36,000; Chollar (for December) \$27,144; Hanauer, 4, \$12,600; Silver Reef (for December) \$22,264; Germania, 4, \$5153; Hanauer, 5, \$2470; Germania, 5, \$1706; Hanauer, 6, \$4800; Crescent, 6, \$5700; Germania, 7, \$3328; Hanauer, 7, \$2460; Germania, 8, \$1577; Hanauer, 8, \$5500.

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

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## ASSESSMENTS.

COMPANY.	LOCATION.	No. AM'T.	LEVIED.	DELINQ'T.	SALE.	SECRETARY.	PLACE OF BUSINESS.
Alta S. M. Co.	Nevada.	38.	50.	Nov. 23.	Jan. 3.	Jan. 23.	W. H. Watson.....302 Montgomery St
Alpha Con M Co.	Nevada.	1.	25.	Jan. 9.	Feb. 15.	Mar. 6.	C. E. Elliott.....309 Montgomery St
Blue Lakes Water Co.	California.	1.	1.00.	Dec. 12.	Jan. 20.	Feb. 14.	R. N. Van Brunt.....318 Pine St
Belle Isle M Co.	Nevada.	11.	15.	Dec. 14.	Jan. 17.	Feb. 7.	J. W. Pew.....310 Pine St
Best & Belcher M Co.	Nevada.	39.	50.	Jan. 4.	Feb. 9.	Mar. 12.	L. Osborn.....309 Montgomery St
Crown Point G. & S. M Co.	Nevada.	48.	50.	Jan. 4.	Feb. 8.	Feb. 29.	J. Newlands.....329 Pine St
Central California Oil Co.	California.	6.	1.00.	Nov. 17.	Dec. 27.	Jan. 24.	J. G. Halse.....314 California St
Chollar M Co.	Nevada.	21.	10.	Dec. 5.	Jan. 10.	Jan. 31.	C. E. Elliott.....309 Montgomery St
Commonwealth Con M Co.	Nevada.	6.	50.	Dec. 29.	Feb. 6.	Feb. 28.	H. Deas.....309 Montgomery St
Champion M Co.	Nevada.	28.	10.	Dec. 12.	Jan. 14.	Feb. 2.	T. Wetzel.....522 Montgomery St
Eva Con M Co.	Nevada.	1.	15.	Jan. 5.	Feb. 10.	Mar. 5.	J. Stadfield Jr.....309 Montgomery St
Found Treasure M Co.	Nevada.	1.	06.	Nov. 5.	Dec. 10.	Dec. 30.	J. Stadfield Jr.....419 California St
Heath M Co.	Idaho.	2.	15.	Nov. 4.	Dec. 10.	Dec. 30.	W. L. Oliver.....329 Montgomery St
Iowa M Co.	Nevada.	18.	25.	Dec. 21.	Jan. 24.	Feb. 11.	C. B. Higgins.....405 California St
Kossuta M Co.	Nevada.	9.	10.	Nov. 25.	Jan. 5.	Feb. 6.	C. K. Sturtevant.....309 Montgomery St
Live Oak Drift M Co.	California.	7.	05.	Dec. 12.	Jan. 18.	Feb. 8.	T. Wetzel.....522 Montgomery St
Manhattan M Co.	Nevada.	7.	1.01.	Dec. 9.	Jan. 12.	Jan. 31.	J. Crockett.....327 Pine St
Mayflower M Co.	California.	39.	25.	Nov. 23.	Dec. 23.	Jan. 15.	J. Morio.....329 Montgomery St
Morgan M Co.	California.	12.	15.	Nov. 26.	Dec. 31.	Jan. 24.	C. S. Neal.....230 Montgomery St
Navajo Con M Co.	California.	25.	50.	Dec. 20.	Jan. 24.	Feb. 28.	G. Sessions.....309 Montgomery St
Nevada Con M Co.	Nevada.	16.	35.	Jan. 10.	Feb. 14.	Mar. 6.	J. W. Pew.....310 Pine St
Nevada Queen M Co.	Nevada.	3.	50.	Dec. 16.	Jan. 24.	Feb. 14.	H. Deas.....309 Montgomery St
Occidental M Co.	Nevada.	1.	25.	Dec. 18.	Jan. 16.	Feb. 8.	A. K. Durbow.....309 Montgomery St
Potosi M Co.	Nevada.	29.	50.	Nov. 30.	Jan. 5.	Jan. 26.	C. E. Elliott.....309 Montgomery St
Sierra Nevada M Co.	Nevada.	91.	25.	Dec. 7.	Jan. 11.	Jan. 30.	E. L. Parker.....309 Montgomery St
Utah Con M Co.	Nevada.	3.	25.	Dec. 13.	Jan. 17.	Feb. 3.	A. H. Fish.....309 Montgomery St

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE.
Black Diamond Coal Co.	Nevada.	J. H. Dohinson	305 Sansome St.	Annual.	Jan. 16
Crocker M Co.	Arizona.	A. Waterman	309 Montgomery St.	Annual.	Jan. 16
J. Beyerle M Co.	Nevada.	J. W. Pew	310 Pine St.	Annual.	Jan. 16
Kossuth M Co.	Nevada.	O. K. Sturtevant	320 Montgomery St.	Annual.	Jan. 16
Lone Star M Co.	Nevada.	A. W. Blundell	142 Clay St.	Annual.	Jan. 21
S. F. Copper Co.	Nevada.	H. Pichor	320 Sansome St.	Annual.	Jan. 16
Sierra Nevada M Co.	Nevada.	E. L. Parker	309 Montgomery St.	Annual.	Jan. 18
Alphabetic Bank M Co.	California.	T. Watkinson	306 California St.	Annual.	Jan. 18
Utah Con M Co.	Nevada.	A. H. Fish	309 Montgomery St.	Annual.	Jan. 25
William Penn M Co.	Nevada.	J. J. Scoville	309 Montgomery St.	Annual.	Feb. 7

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A. W. Havens	309 Montgomery St.	50	Jan. 10
Deerhoe Blue Gravel M Co.	California.	T. Wetzel	522 Montgomery St.	10	May 19
Eureka Con M Co.	Nevada.	H. R. Hutton	306 Pine St.	25	Jan. 9
Evans Valley M Co.	Nevada.	L. Letts	309 Montgomery St.	10	Apr. 15
Russell Reduction & M Co.	California.	J. Morio	328 Montgomery St.	95	Sept. 17
Silver King M Co.	Arizona.	J. Nash	328 Montgomery St.	25	July 15
San Francisco Copper M Co.	California.	F. E. Berler	320 Sansome St.	44	Sept. 19
Standard Con M Co.	California.	J. W. Pew	310 Pine St.	65	Jan. 12

## San Francisco Metal Market.

WHOLESALE. THURSDAY, Jan. 12, 1888.

NAME OF COMPANY.	WHOLESALE.
ANTIMONY—French Star.	91 @ —
BORAX—San Bernardino.	61 @ 7
Armstrong.	6 @ 6 1/2
COPPER—	
Bolt.	26 @ 30
Sheeting.	— @ 25
Ingot.	16 @ 18
Fire Box Sheets.	25 @ 26
IRON—Glenbrook ton.	— @ 30 00
Eginton, ton.	— @ 35 00
American Soft, No. 1, ton.	— @ 35 00
Oregon Pig, ton.	21 @ 23 00
Clay Lane White.	22 @ 50
Shotts, No. 1.	31 @ 00
LEAD—Pig.	5 @ 00 50
Bar.	5 @ 00 50
Sheet.	8 @ —
Shot, discount 10% on 500 bag.	Drop, 3 bag. 180 @ —
Buck, 3 bag.	2 @ 00
Chilled, do.	2 @ 00
STEE—English B.	16 @ 25
Black Diamond, ordinary sizes.	91 @ —
Plow.	44 @ 6
Machinery.	44 @ —
Naylor & Co.	10 @ 16
TRIPLATE—Gon.	5 @ 75 60
Charcoal.	6 @ 75 75
QUICKSILVER—By the flask.	— @ 50 00
Flasks, new.	1 @ 05 @ —
Flasks, old.	85 @ —

## New York Metal Market.

Telegraphic advices dated Jan. 12th give the following New York prices:

SILVER—96 1/2 per oz.  
 BORAX—61 @ 6 1/2.  
 COPPER—LARK—\$16 @ 17.00.  
 IRON—No. 1, \$22 00.  
 LEAD—\$4 57 1/2.  
 TIN—\$37.00.

The following is the latest by mail from the "New York Metal Exchange Market Report":  
 COPPER—Firm, spot closing at \$17.70 @ 17.00. Transferable Notices (Lake) issued at \$16.00 @ 15.00.  
 LEAD—Firm at \$4.96 @ 15 spot. Transferable Notices issued at \$5.10.

TIN—Strong at \$36.90 @ 37.20. Transferable notices issued at \$37.10.

MAKERS' PRICES—At tide-water. 100-ton lots of listed irons (when brand and specified) range nominally about as follows: Lehigh, Grade No. 1, \$20.60 @ 21.00; No. 2, \$19.60 @ 20.00; Grey Forge, \$17.00 @ 17.50; Hudson River, Grade No. 1, \$20.60 @ 21.00; No. 2, \$19.00 @ 20.00; Grey Forge, \$17.00 @ 17.50; Southern, Grade No. 1, \$20.00 @ 21.00; No. 2, \$19.00 @ 20.00; Grey Forge, \$17.00 @ 17.50.  
 Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, \$37.00 @ 37.60; Biliton Tin, \$37.00 @ 37.60; Banca Tin, \$37.00 @ 37.60; Baltimore Copper, \$14.75 @ 15.25; Orford Copper, \$15.25 @ 15.75; P. S. C. Copper, \$13.00 @ 14.00; Foreign Lead, \$5.40 @ 5.60; Foreign Spelter, \$8.10 @ 8.30. Antimony, \$11.25 @ 11.40.

## Mining Share Market.

The stock market continues dull and heavy, and the leading securities are at quite a low standard. This seems in no way to discourage the miners up on the Comstock who are working away and developing their mines vigorously. The Virginia Enterprise says: The new ore body on the 700 level of the Hale and Norcross is expanding in every direction, and the ore instead of deteriorating is growing richer at all the more important and significant points as the work of development is proceeded with. Even as it now stands, this ore body is the biggest bonanza that has been struck on the Comstock in many years. It is a huge, clear and clean body of ore, with no water or anything else to interfere with its easy and expeditious extraction. It is almost like so much money in the bank.

In the Yellow Jacket mine a promising development was made some days ago on the 1100 level in the main east drift. As the ore was cut into at a point near the Confidence line, it also promises well for that mine.

The Con. Cal. and Virginia Co. last Wednesday shipped below \$77,000 in bullion, making a total of \$259,000 for December, with another cleanup yet to be shipped.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Dec. 22.	WEEK ENDING Dec. 29.	WEEK ENDING Jan. 5.	WEEK ENDING Jan. 12.
Alpha.	1.50	2.01	2.25	2.61
Alta.	1.55	2.35	1.25	1.50
Andes.	1.35	1.65	1.10	1.2
Argenta.	20.	15.	20.	20.
Belcher.	7.00	11	5.75	7.50
Brophy.	1.00	1.00	1.00	1.00
Best & Belcher.	7.10	8.00	6.50	6.85
Bullion.	1.75	2.30	1.50	1.94
Baltimore.	1.00	1.20	.95	1.00
Belle Isle.	1.00	1.00	.45	.50
Bodie Con.	2.90	3.2	2.25	3.10
Bodie.	3.10	3.10	2.70	2.80
Bodie.	3.10	3.10	2.70	2.80
Bulwer.	95.	70.	75.	80.
Con. Va. & Cal.	201.	218.	182.	204.
Challenge.	2.85	3.00	2.00	2.2
Champion.	65.	62.	60.	60.
Chollar.	59.	62.	60.	60.
Confidence.	9.50	11.	8.75	9.00
Con. Imperial.	2.90	2.90	2.90	2.90
Caledonia.	50.	60.	35.	45.
Central.	1.20	1.20	1.20	1.20
Crown Point.	71.	106.	6.50	7.75
Crocker.	85.	1.08.	75.	80.
Central.	1.00	1.00	1.00	1.00
Dudley.	25.	25.	25.	25.
East H. & S.	1.00	1.00	1.00	1.00
Eureka Con.	1.10	1.40	1.00	1.15
Exchequer.	1.10	1.40	1.00	1.15
Grand Prize.	1.20	1.35	1.10	1.20
Gould & Curry.	4.70	6.00	4.00	4.70
Hale & Norcross.	8.00	8.00	8.00	8.00
Holmes.	1.00	1.00	1.00	1.00
Independence.	1.00	1.00	1.00	1.00
Iowa.	50.	50.	50.	50.
Justus.	30	1.35	70.	85.
Kentuck.	35.	60.	35.	45.
Lady Wash.	35.	60.	35.	45.
Martin White.	2.00	2.20	1.50	1.60
Mon.	4.90	6.00	4.50	5.00
Mexican.	4.90	6.00	4.50	5.00
Mt. Diablo.	5.00	5.00	5.00	5.00
Northern Belle.	1.00	1.00	1.00	1.00
Navajo.	1.00	1.00	1.00	1.00
North Belle Isle.	7.50	6.00	7.25	8.25
Flag.	2.60	2.80	2.25	2.30
Nev. Queen.	1.10	1.10	1.10	1.10



## Consolidated Miners' Union.

There is a movement on foot in this city to organize a "Consolidated Miners' Union," with headquarters in San Francisco, and branches in the various mining districts of the Pacific Slope. A circular letter has been issued and sent to mining men, calling for a meeting. Jas. H. Crossman is at present acting as secretary of the committee. The following is from the circular letter referred to:

The object of this letter is for the purpose of securing the co-operation of not only mineral producers, but all classes that are interested in the prosperity and advancement of our mining industries, which have been, and should be to-day, the paramount industry of the entire region west of the Sierra Nevada range.

Metallic gold was the factor that first incited immigration, and the product of our mines attracted the attention of the entire civilized world. The State of California sprang into existence as if by magic, and in the brief space of one decade assumed a position in our federation second to none.

During the late civil war the golden product from our mines preserved the integrity of our Union, it built and equipped our transcontinental road, which was considered at that time a military necessity.

The gold and copper of California and the silver and lead from the State of Nevada furnished the capital that built our cities and made our population richer per capita than any other State in the Union.

Regardless of politics, we claim that there should be a protective tariff sufficiently large to protect the products of our mines. Let the duty on iron, coal, copper, lead and other minerals be removed, and we cease to produce, with an immense loss to mine-owners, and hundreds of thousands of operatives thrown out of employment.

We require Congressional action during the present session of Congress, and in place of removing the tariff on the above-named metals, we ask our Senators and Representatives in the Halls of Congress to do all in their power to increase it, in order to protect those industries as against the foreign production.

With this object in view we ask your earnest co-operation by unity of action and assistance in the formation of a Consolidated Miners' Union, composed of men of known and established integrity. We expect to accomplish our object, and that our voices as a unit will have weight in the Halls of Congress during the present session, thereby fostering and protecting our mineral interests.

We ask you to become a member of this organization. We ask both moral and material aid in furtherance of our views. The expense to each individual member will be nominal, compared to the benefits that we shall naturally derive.

We propose to establish our headquarters in San Francisco, with ramifications and branch organizations extending from New Mexico on the south to British Columbia on the north, inclusive of all the mining districts on the Pacific Slope.

Organization and consolidation of interests is the only safe mode of protection. It commands the attention of the public and the press, and insures Congressional action. Concentrated organization is a necessity for protective purpose.

We are advancing no new theory, no chimerical scheme, but one that has been adopted and efficacious in the production and manufacture of all the great staples of the world. Where would the manufacturing interests of New England have been, had it not been for a most thorough system of co-operation and organization in the infancy of their industries?

The protective tariff had bitter opponents, free trade was advocated, and the New England Manufacturing Association was formed and compelled to act in union in order to foster and protect their industries. They selected the celebrated orator and jurist, Daniel Webster, as their champion, and it was largely due to his exertions that they won the fight and succeeded in establishing an industry that made New England prosperous beyond precedent.

We say again: We ask your co-operation and device as to the best mode of procedure in the accomplishment of our object, and a prompt response to this circular, addressed to the undersigned, will receive due consideration and attention. By order of the committee.

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by leading their influence and encouraging favors. We intend to send none but worthy men.

F. B. LOAN—Santa Clara Co.  
JOHN C. H. LAMPADUS—San Benito Co.  
G. W. INGALLS—Arizona Territory.  
WILLIAM POOL—Fresno Co.  
WM. WILKINSON—San Joaquin and Stanislaus Co's.  
A. F. JEWETT—Tulare Co.  
E. H. SCHAEFFLE—Flacsa, Sacramento, El Dorado Co's.  
C. E. WILLIAMS—Yuba and Sutter Co's.  
R. G. HUSTON—Montana Territory.

## Don't Fail to Write.

Should this paper be received by any subscriber who does not want it, or beyond the time he intends to pay for it, let him not fail to write us direct to stop it. A postal card (costing one cent only) will suffice. We will not knowingly send the paper to any one who does not wish it, but if it is continued, through the failure of the subscriber to notify us to discontinue it, or some irresponsible party requested to stop it, we shall positively demand payment for the time it is sent. LOOK CAREFULLY AT THE LABEL ON YOUR PAPER.

**MINES IN TERRITORIES.**—In a recent interview James G. Fair stated that he favored the passage of Senator Hearst's measure to allow the sale of mining properties in Territories to aliens. "It is necessary," he remarked. "As a rule Americans do not invest in mining properties. The wealthier men owning mines are all old and will soon pass away. If they cannot sell to foreign people the properties may lay unworked for years."

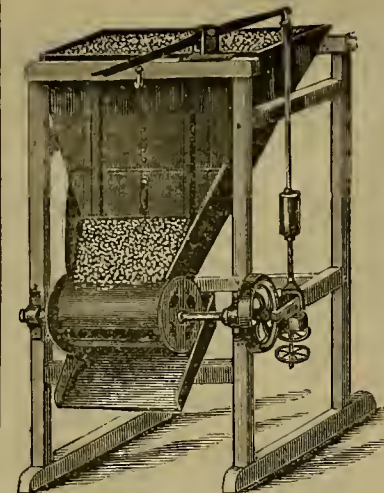
THE canned-goods exchanges of Baltimore are making efforts to have the duty taken off tin or greatly reduced. It is estimated that 150,000,000 cans are made there annually.

HOMESTAKE MINING COMPANY has declared its 113th regular monthly dividend of 20 cents per share, or \$25,000; total dividends to date, \$3,993,750.

IN Southern California the building of the Great Salt Lake and Los Angeles Railroad is considered assured.

## THE ROLLER ORE FEEDER

[Patented May 28, 1882.]



This is the best and cheapest Ore Feeder now in use. It has fewer parts, requires less power, is simpler in adjustment than any other. Feeds coarse ore or soft clay alike uniformly, under one or all the stamps in a battery as required.

In the Bunker Hill Mill it has run continuously for two years, never having been out of order or costing a dollar for repairs.

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Sole Manufacturers,  
527 First Street, San Francisco, Cal.

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Ores, Mining, and Commission,

420 Montgomery St., S. F.

BUSINESS MANAGER OF

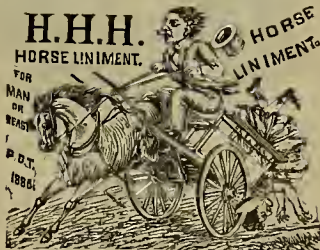
UNION COPPER MINE, Calaveras Co.,  
NEWTON COPPER MINE, Amador Co.  
Correspondent as Agent for Smelters in London, Liverpool, New York, Boston and Baltimore.

Twenty years experience, in California, purchasing Ores and dealing in Mines.

Special attention given to management and sales of mines and purchase and shipment of copper produce.

## QUARTZ MINES FOR SALE.

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For Sale by all druggists.

## DIVIDEND NOTICE.

## The German Savings and Loan Society.

For the half year ending December 31, 1887, the Board of Directors of the German Savings and Loan Society has declared a dividend at the rate of four and one-half (4 1/2) per cent per annum on term deposits, and three and three-fourths (3 3/4) per cent per annum on ordinary deposits, and payable on and after Tuesday, the 3d day of January, 1888. By order

GEO. LETTE, Secretary.

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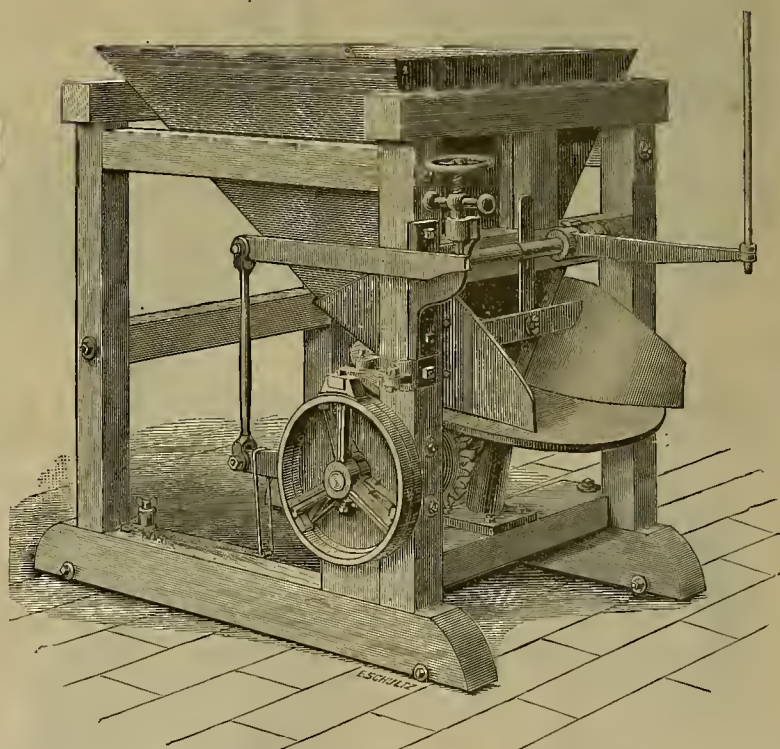
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D. C. WICKHAM, Taylor Mine, Greenwood, Cal.  
J. R. TREGLOAN, Supt. South Spring Hill Gold Mining Co., Amador City, Cal.  
W. G. ROBERTS, Greenwood, El Dorado Co., Cal.

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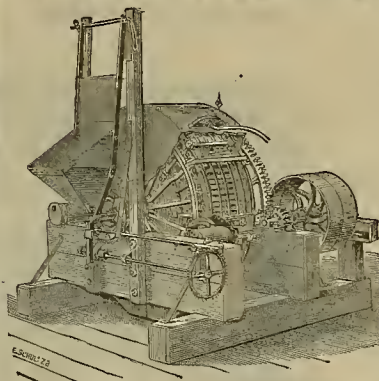
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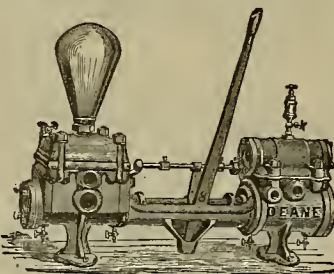
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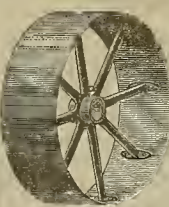
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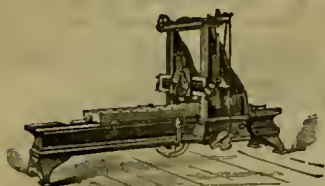
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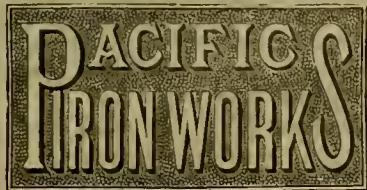
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California Cotton Mills, East Oakland.	1 150 H. P.	Selhy Smelting Works, Vallejo Junction.	1 75 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
Harmony Borax Mining Company, Alameda.	1 75 H. P.	Oakland Gas Light Co., Oakland.	1 200 H. P.	La Luz Mining Co., Mexico.	3 75 H. P.
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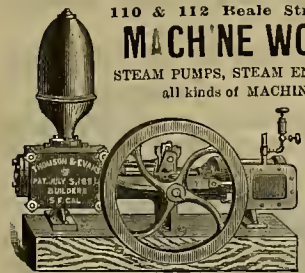
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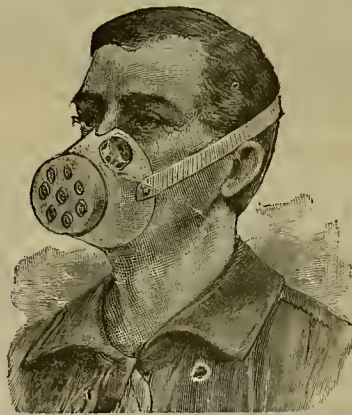
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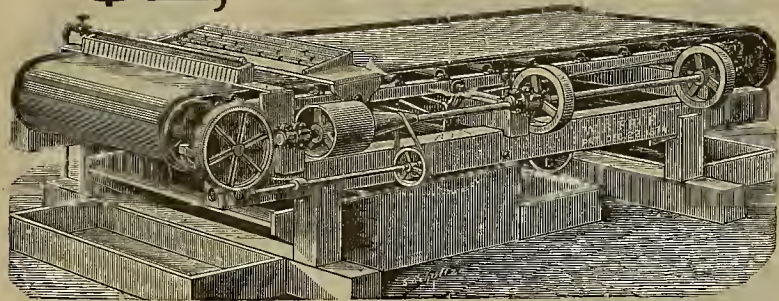
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OVER 1400 ARE NOW IN USE. Concentrations are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

THE MONTANA COMPANY (Limited), London, October 8, 1885.

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N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

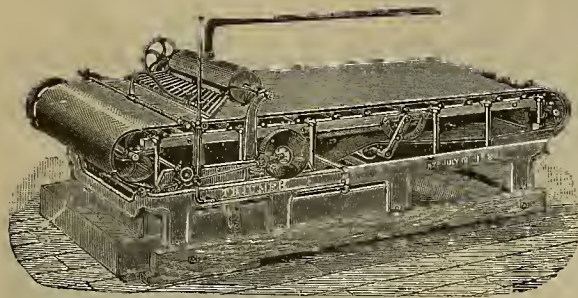
ADAMS & CARTER.

Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

**THE FRUE ORE CONCENTRATOR OR VANNING MACHINE.**

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**THE "TRIUMPH" ORE CONCENTRATOR.**

The present improved form of this celebrated "TRIUMPH" Ore Concentrator possesses many advantages over any other style of Vanners, Vanning Machines, or Concentrators, yet introduced to the notice of mining men. These advantages consist in the superior features which enter into their construction, and facilitate their operation.

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WM. H. TAYLOR, President.

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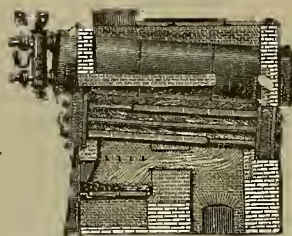
L. R. MEAD, Secretary.

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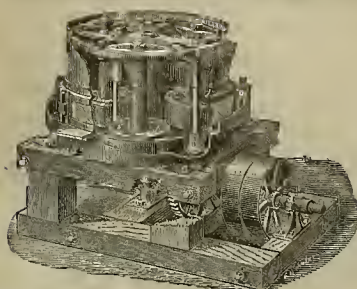
**Centrifugal Roller Quartz Mills,  
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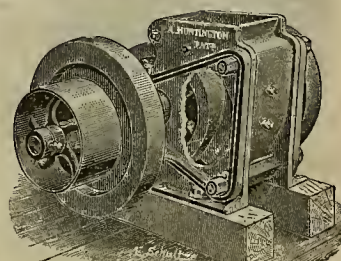
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An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
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SAN FRANCISCO, SATURDAY, JANUARY 21, 1888.

VOLUME LV  
Number 3.

## Train Telegraphy.

Not many months ago the Railway and Telegraph Co. and the Phelps Induction Co. combined their interests and patents into one new company under the name of the Consolidated Railway Telegraph Co. Then a series of experiments were made on the line of the Lehigh Valley R. R. Co. to compare the two systems and ascertain the best manner of combining them.

After a course of careful experiment, the electricians of the company found that they could, by selecting the best features of both systems, produce a simplified method combining all the valuable features of each, which would be very much superior in simplicity, certainty of operation and ease of application to either of the others. The system is covered by a large number of patents, protecting not only the foundation principle involved, but also numerous details absolutely necessary in induction telegraphy. By means of the "duplex" feature it can also be used for telegraphing between side stations or terminal stations and moving trains, and simultaneously telegraphing between stations by the ordinary Morse system. This system of train telegraphy works equally well in all kinds of weather.

In brief, the new combined system mainly consists in the use of a "short pole" telegraph line extending along the side of the railroad track at about a distance of 8 or 10 feet from the line, the poles being much smaller than ordinary telegraph poles and from 10 to 16 feet high. At their top is placed an ordinary glass or porcelain insulator, strung upon which is a single galvanized steel (or iron) telegraph wire, about No. 12, American gauge. The equipment of the car is simple, mainly consisting in the use of an iron or brass rod or tube, about half an inch in diameter, extending along each side of the car under the eaves (also, instead of employing this metal rod or tube, in many cases the metal roof of the car is used to advantage in their equipment), and connected by means of an insulated copper wire with the battery and instruments in the car, which are grounded

through the wheels and track by means of a single wire run through the floor as shown by Fig. 1. In this cut *A* represents the roof contact; *B*, rod or strip of metal, substitute for roof, if roof not practicable; *C*, secondary of induction coil; *D*, double pointed key with extra contact; *E*, telephone receiver; *F*, primary circuit; *G*, ground contact on box; *H*, battery. The instruments are small

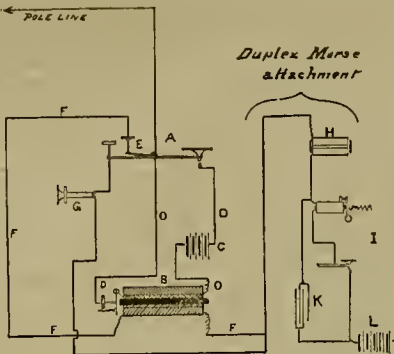


Fig. 3—Arrangement of Apparatus at Terminal Station.

actual use in connection with and upon six daily trains of the New Jersey division of the Lehigh Valley R. R. See Fig. 4.

The cost of equipping a railroad with this system in the above manner depends somewhat upon the character of the roadway, nearness to telegraph pole markets, etc., but it can be stated approximately to be about \$50 per mile for line equipment (i. e., poles, placing of

train a telegraph office in constant electrical communication, as in the usual telegraph business.

Fig. 3 shows the details of arrangement of apparatus at terminal station. In this cut *A* is the double pointed key; *B*, induction coil; *C*, battery; *D*, primary circuit; *E*, extra contact key; *F*, secondary circuit; *G*, telephone and circuit; *H*, electro magnets; *I*, Morse apparatus; *J*, earth connection; *K*, condenser.

The first cost of placing this system upon a railroad has already been stated, and when the fact is taken into consideration that it affords a railroad company a distinct, separate and perfectly equipped duplex telegraph line, useful not alone for train telegraphy, but also available at all times for ordinary telegraphy between stations, it can readily be seen by comparing the advantages and conveniences obtained

that the actual cost of equipment of line, rolling-stock, etc., is less than that of any signal or block system, even of the simplest description that has ever been presented to the railroad public.

In regard to the expense of operating upon freight trains, the method of using this system has demonstrated that it is possible to have the freight conductor, or some other member of train crew, a telegraph operator. Upon passenger trains a separate operator in most cases would be necessary.

In Fig. 4 is shown the interior of a car with train telegraph operator sending a message on a moving train. The sending apparatus is shown in the operator's hands, the receiver being attached to his ear. The

operator can be in any car, but is best located in the middle of the train. Thos. A. Edison is the consulting electrician of the Consolidated Railway Telegraph Co., Chas. A. Cheever, president, and Henry D. Hall, secretary. The general offices of the company are at 13 Park Row, New York.

JOHN W. MACKAY has gone to the Comstock to again give his personal attention to the work in the mines controlled by his firm.

FOUR new life-saving stations are to be established by the Government in the vicinity of San Francisco.



Fig. 4—Sending Telegram on Moving Train.



Fig. 2—Main Operator's Equipment with Battery.

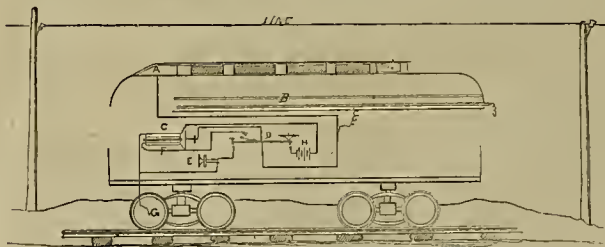


Fig. 1—Car Equipment.

## TELEGRAPHING FROM A MOVING TRAIN.

and compact, and consist of the telephone receiver (upon head of operator), [see engraving] a small secondary coil and buzzer, and an ordinary telegraph key, these last two being placed upon a board about 10 or 15 inches square, held conveniently upon the arm of the operator.

The battery consists of a few cells in a small box conveniently carried in one hand. See Fig. 2. The cars can be quickly and easily equipped without interfering in any way with their appearance or causing delay. The equipment of a station is similar to that of a car. See Fig. 3. The equipment of a "line" station is adapted to the regular "Morse" apparatus. This is the apparatus and equipment now in

same, wire, labor, insulators, etc.), and the cost of equipping a car about \$15, only one car on each train needing to be equipped. When the ordinary telegraph wire on the side of the track is near enough to the line of road, it is possible to use that wire.

There are now two distinct uses of this system of train telegraphy. The first is for the purpose of having train dispatchers and other railway officials in constant and instant communication with all trains on their road, whether in motion or standing still, and for the purpose of preventing accidents by mistakes occurring in transmitting train messages by side stations. The second use is in making every



### Battery and Pan.

#### The Electric Process on the Comstock.

The Virginia Enterprise says: There has not been a single change made in the system of wire rope transmission of energy from Pelton wheels as adopted at the Con. Cal. Va., and there will not be. This statement is called forth by the fact that it has been said that the system was only a qualified success—a mere make-shift. The truth is that there has not been even a bolt touched since they were put in, and to-day everything connected with the system is running almost perfect.

#### Where the Trouble Has Been.

The trouble experienced so far has been confined exclusively to the splices in the wire ropes. The motion of the ropes caused a given amount of friction, and this chafing of strands in the splices soon parted them. Now oil is used that penetrates the hemp core, and this in turn lubricates the strands on the inside, preventing chafing and wearing out. The splicers are getting the thing down finer and putting in better splices, and no further trouble will be anticipated from that source after the first splices made have been renewed, if they should at any time require renewal. The chafing that existed was ascertained by taking out the splices and examining each strand separately.

#### Two More Wire Ropes.

An extra wire rope will soon be put on to transmit power to the pan-mill and another one to the battery-mill. Additions are already being put on the towers on the southeast side, and Alex. McCone of the Fulton foundry is molding the grooved wheels. The object of putting on this extra rope is merely precautionary, so that in case of the parting of strands in any of the other ropes all there will be to do will be to detach the injured rope and there will remain three to do the necessary work. At the battery-mill the work is already far advanced toward completion. There is now a seven-eighths inch rope there which drives 70 stamps and 12 Boss special grinders. The additional rope will relieve the present rope about 48 per cent and drive 10 additional stamps.

Tighteners have recently been placed at the pan-mill and at the starting-place at the driving shaft, and it is now only the work of a minute to tighten a rope up even with its mates.

The engines at the pan and battery mills are also kept in running condition in case of any possible emergency, and it would be the work of only a few hours to run both mills by steam-power if occasion should require it, but this is a very remote contingency.

#### Water-Power.

This subject, though often treated, is but slightly understood. An aperture 12½ by 12½ inches, under a pressure of six inches above the top of the opening, will discharge 200 inches, and is the basis of all measurements where water is retailed in small quantities in the States of California and Nevada. A miners' inch will discharge a quantity of water equal to 12,250 cubic feet, or about 17,000 gallons, or 139,000 pounds, in 24 hours. At the Con. Cal. Va. they are using 135 miners' inches, or 2,300,000 gallons, in 24 hours. This is equal to a weight of 19,166,666½ pounds of water. It furnishes 600-horse power on four Pelton wheels. When they are running all their machinery in both mills, including dynamos, special grinders, small pans, etc., they will use 160 inches. As things are now run there are 400 horse power left on the wheels, and when everything is running there will be nearly 200-horse-power left, which they may use to run dynamos to furnish either light or power. Things are so arranged that they can run the machinery down to 10 revolutions per minute, and allow them to change belts, or run it up to 200 revolutions per minute. If that does not prove complete control of a giant power, what does?

#### The Electric Process.

Mr. Shepard Brickell, electrician, has placed five dynamos in the engine-room of the pan-mill and connected them by belt and pulley with the transmitted water-power. It is impossible to understandingly describe the modus operandi, but, to make it short, the entire work may be conducted from the engine-room by pressing on buttons and cutting off circuits or releasing them. Ten or 20 pans are ready to run and 10 more are far advanced toward completion. Only half of the mill will be treated by the electric process at present, and the result will be compared with the workings of the other half.

The electric attachments to the pans are very simple propositions. The pans are wooden-coated inside, and the shoes are made of wood. The electric anode, or positive pole, consists of a flat iron rim, fitting the pan, from which are suspended a large number of light iron pendants, and the bottom of the pan acts as the cathode or negative pole. The connection is made from the electric wire by four light iron rods, which sustain the weight of the whole. The pendants conduct the electricity to the quicksilver, help amalgamation and prevent flouing of the quicksilver.

#### Miscellaneous Notes.

The Boss process at the pan-mill is an unqualified success. There is not a mill in the State that works ore to as high a percentage,

and its progress since its introduction here has been continually for the better.

The men in charge of the transmission of power and of both mills have worked hard for success, and are entitled to due credit for the eminently satisfactory condition of things which they have brought about.

There is no question about the success of the entire undertaking. It is now not only as assured but a positive fact, fully demonstrated. The battery and pan mills now turn out more billion than any other mill in the State.

### Oil and Gas Found.

A very interesting report comes from the oil-well west of here. Mr. Hambleton came in last week and stated that at a depth of 720 feet his tools broke through the oil sandstone, in which he had been boring for some distance, into a gravel-bed, and immediately an immense volume of gas issued forth from the well. So great was the volume and its force that it blew oil and gravel as large as walnuts, out at the top and into the air some 30 or 40 feet. The workmen were compelled to leave the spot, the gas being suffocating. It had continued to pour out for some days when he left and there was no apparent diminution in the supply since the first outburst. As it rises out of the pipe it has a bluish cast and the odor is exactly like that of regular coal gas. He thinks that the first outburst raised gravel and oil that has somewhat choked the pipe, and that when that obstruction is removed he may have a flowing oil-well as well as an inexhaustible gas-well. This property is in section 19, township 30 south, range 22 east, M. D. B. and M., and is owned by the Union Land and Oil Company, the principal stockholders being residents of Georgia. Should the well prove to be as strong as it now appears to be, another one will be immediately sunk near it. The oil obtained is of a good quality of the black oil. Besides their oil and gas prospects, the company has some large beds of asphaltum that will be valuable when a railroad is built near them. The Sunset Oil Company is daily expecting machinery to arrive from the East with which they will bore for oil on their property, which is also in the western part of this county. We learn also that Hirschfeld Bros. and R. T. Norris will soon begin a well on the latter's ranch with the hope of securing oil or gas or both. This well will be only eight or nine miles from Bakersfield, between here and the Kern River canyon. Gas can now be detected escaping from the ground in that vicinity.—Kern Co. Echo.

### California Forests.

The California State Board of Forestry some time since prepared a bill providing for the better care and protection of Government forest lands in this State not suited for agriculture. The bill provides that on and after its passage the said lands shall be withdrawn from sale and entry, and shall not be alienated from the United States Government. The said lands shall then be placed under the management and control of the State Board of Forestry, who shall provide for the perpetuation and removal of the forest growth—mark such timber as may be properly cut and sell the same, provided that the said Commission shall turn into the Treasury of the United States all funds received by them for timber, fuel, privilege of pasture, hunting permits, and for any further purpose over and above the cost of maintenance of said forest lands.

Copies of this bill were sent each member of the Pacific Coast delegation, and Congressman Thompson and Senator Stanford were requested to introduce and look after it. Mr. Thompson has already introduced the bill in the House, and recently the following telegram was received by the Secretary of the Board of Forestry from Senator Stanford:

"I intend to introduce a bill of some kind, but differing materially from your proposed bill. When prepared, I will send you a copy."

**STOCKTON'S ELECTRIC ROAD.**—Hanna, Swaine & Co. have 75 men at work grading the streets preparatory to laying the rails for the electric motor road. The line will be about ten miles in length, running through the principal streets and to all the railway depots and boat landing. A company is being formed with \$500,000 capital. The road will have no wires overhead nor underneath, but the power of each car will be stored in the batteries under the seats. The construction of the cars will be the same as that of the Market-street cable cars, but they will be a trifle smaller, being 22 feet long, while the Market-street cars are 26 feet long. Several cars for the line are already in course of construction. The contractors expect to have the road completed and in running order by Sept. 1st of this year.

The coal famine in the Puget Sound district still continues. Only one company now sells to local customers, the others having orders to ship all that is mined to San Francisco. The people are, therefore, laying in stocks of cordwood and bark. Six dollars and fifty cents per ton is the price now asked in the local market, a figure never before reached.

MONO COUNTY has realized so far from the tax on sheep driven into that county the sum of \$5025.

### About Colors.

Nothing can so benefit the painter as the study to familiarize himself with the conditions of a proper contrast upon which the beauty of color in a pattern or design depends. Contrast, says a writer in the *Painters' Magazine*, is not confined to the most intense and powerful colors, but includes those modifications by which one color is enhanced by the subordination of others, or a greater prominence given it. That color may be either a pure primary or secondary, or may merely predominate as a tint in a compound. All contrasts must refer to one of the primary colors, and harmony will depend on the quantity, or intensity, of the contrast. As two of the primary colors united form a contrast to the third, so with the secondary, tertiary and other colors in which they predominate as a tone. To reduce the intensity of a simple color we must do so by mixing with it a certain portion of the colors produced by the union of the other two primaries. There are only three proper contrasts of color in nature, and all colors are modifications of these. Pure red is the most intense and perfect contrasting color to green, because neither blue nor yellow exists in its composition; and on the other hand, pure green is the most perfect contrast to red, because it is composed of yellow and blue only. When any two of the three primary colors are united together in a secondary color, they are deprived by neutralization of one-half their power; therefore in the contrast of red and green, red most strongly asserts itself. But when pure green is opposed to red, green becomes the characteristic color of the contrast, because the yellow and blue, by which the red is neutralized to a contrast, are the constituents of green, and consequently give it a species of predominance over the red. Such is the simple nature of contrast upon which the chromatic harmony solely depends.

Every proper arrangement of color must have a key, and the key must be one of the primary or secondary colors, and, either because of its intensity or as a neutralized hue, must have all other colors subordinated to it to give them their true beauty and expression.

#### Complementary Colors.

All colors have their complementaries, which add to or detract from the beauty of the adjoining colors, according to what they may be, says a writer in a cotemporary. Thus, the complementaries of red are green; blue are orange; yellow are violet. If you cut out pieces of gray paper in an ornamental form, and stick a piece on each of the three colors I have named, you will find, in a shaded light, the gray will be fully tinted by the complementaries of these colors. But you cannot lay down precise rules. An experienced artist can bring any two colors together by properly modulating them. Nothing is so charming and so refreshing to the eye as a harmonious arrangement of colors. They are "like a sweet chord of music to the sense." The hand of nature never errs, whether it brings together scarlet and crimson, as in the cactus; scarlet and purple, in the fuchsia; yellow and orange, as in the calceolaria; or the colors in the varied plumage of exotic birds, the harmony is always beautiful, ever perfect. The laws of harmonious coloring are a necessary part of the knowledge of the manufacturers of colored fabrics. I will suggest a few contrasts:

1. Black and warm brown. 2. Violet and pale green. 3. Violet and light-rose color. 4. Deep blue and golden brown. 5. Chocolate and bright blue. 6. Deep red and gray. 7. Maroon and warm green. 8. Deep blue and pink. 9. Chocolate and pea green. 10. Maroon and deep blue. 11. Claret and buff. 12. Black and warm green.

#### Curious Effects Which Colors Produce on the Human Mind.

There are some curious things in regard to the way in which the human mind is affected by colors as well as the human sight. How much or in what way animals are affected by colors is not very well understood, but the subject has been investigated enough to know that they are influenced by them, and the future will probably bring out some surprising results to the one who shall thoroughly cultivate this comparatively unexplored field of research.

#### Color Sounds.

Recent observations have developed that some minds associate colors with certain sounds. *Popular Science*, in regard to this peculiarity, says:

We are all familiar with what is termed color-blindness, and the unexpected results that sometimes attend it, but color sound is something which has received much less investigation. Some people can select and appreciate the colors of sounds, and to them the speaking of a name presents, mentally, a well-defined color or combination of colors, different names having different shades or combinations. The same name should, of course, always present the same color or combination when spoken, although, to different people, possessing the faculty, a given name or sound does not present the same characteristics. To prove the first of these two facts a list of names was prepared and the shade or color given by a lady who has this power marked against each one of the list. After several weeks the names were again read to her and the colors designated by her

marked. This course was pursued several times during a year or more, the lady not being allowed to see the results at that time. During these several experiments the only variations in the answers given were such as would be natural where there was some uncertainty in regard to terms; for example, the answer to a given name at one time might be "bluish," at another, "lead color," so what was called "straw color" might afterward be called "buff." The approach to similarity in the shades shows that the same mental picture was present, and only language was at fault. With one or two exceptions these were the only changes noted in the several trials, and the extent to which the experiments were carried warrants the belief that there was a well-defined idea of the color of words.

### Industries and Public Works.

Mr. Townshend, the Representative from Illinois, is about to introduce a bill in Congress to create a new executive department to be known as the "Department of Industries and Public Works." The promoter of the bill says with truth that the variety of interests consequent upon the development and growth of the country demands the creation of many bureaus which were not originally contemplated by the founders of the Government. In order to place them under some responsible supervision they have been apparently assigned by chance to various existing departments, without much systematic or harmonious relation, and thereby the machinery of our Government has to a considerable extent become cumbrous and incongruous. The object of the proposed new department is a consolidation of the bureaus of a cognate character which do not properly have a place in any of the existing departments. The proposed consolidation includes the following departments:

First—The Agricultural Department, which is now attached to the Interior Department.

Second—The Meteorological or Weather Bureau, which is now in the War Department.

Third—The Bureau of Labor, now in the Interior Department.

Fourth—The Improvement of Rivers and Harbors, now in the War Department.

Fifth—The Coast and Geodetic Survey, now in the Treasury Department.

Sixth—The Geological Survey, now in the Interior Department.

Seventh—The Survey of the Public Lands, now in the Interior Department.

Eighth—The System of Construction of Public Buildings, now attached to the Treasury Department.

Ninth—The Bureau of Administration of our Lighthouse System, now under the Treasury Department.

Tenth—The National Observatory, now in the Navy Department.

Eleventh—The Bureau of Patents, now under the Interior Department.

Twelfth—The Inspection of Hulls and Boilers of Steamers, now under the Treasury Department.

Thirteenth—The Interstate Commerce Commission.

Fourteenth—The Fish Commission. Thus it will be seen that these important bureaus, eminently of a scientific and industrial character, are scattered through the several departments, and such assignments are incongruous and unsystematic.

No doubt there will be opposition to this measure, but it is one which, in this, or some modified form, will be adopted before very long. There are many incongruities now apparent in the condition of affairs. The Interior and Treasury Departments now have many bureaus which have nothing really to do with that branch of the Government. In any event, Mr. Townshend's idea is worthy of consideration.

**AMADOR COAL.**—Yesterday morning as a representative of the *Record-Union* was passing along Fourth street he discovered Jud. C. Brunsie endeavoring to talk T. K. Muir to death, and stopped and entered a protest. Brunsie demurred to the interruption, claiming that they were both from Amador, and as for chinning proclivities they were pretty evenly matched. Mr. Muir is superintendent of the Sacramento and Ione Coal Co., whose mine is southeast of the town of Ione, in Amador county, about half a mile from the railroad depot. Mr. Muir is a representative citizen of that section, and expresses great faith in the outcome of Amador county. He says the coal mine of which he is the acting superintendent is owned almost exclusively by Sacramento citizens. J. M. Avery is president, Fred Muir treasurer, and C. Holland superintendent. Among other large stockholders are Chris. Green and Wm. Guttenberger. It will be four years next July since this company commenced operations. They have 130 acres and mine it continually, employing constantly upward of 20 men. The depth of the mine is 75 feet, and the depth of the coal vein from 6 to 20 feet. They mine every month from 1200 to 1500 tons of coal, which finds a ready sale. It is nearly equal to the Mount Diablo coal, and is sold for one-half the price of the latter. The people in Ione City, or at least a large number of them, use no other fuel.—*Sac. Record-Union*.

The recorder's report shows that real-estate transactions were larger in San Francisco in 1887 than in any other year in the history of the city.



## Pure Food and Medicine.

Since the days of the elders when the debasing of foods consisted chiefly of sanding the sugar and watering the vinegar in the back-room of the retail grocery, there has been most alarming progress made in adulterating and debasing nearly all materials which enter into the food of man or minister as medicine to the ousa of the illa to which flesh is heir. So vast has been the extent of this evil work and so far-reaching the application of the nefarious art, that large volumes are published setting forth adulterations as fast as discovered, and still ingenuity begotten of greed is constantly devising new abominations more apt to deceive the consumer and more difficult of detection by the expert. As an indication of vastness one need only recall the mines of white earth which are worked to supply the candy-makers and the mills for grinding soft wood and other refuse for the use of the spice-makers, and these are only items of the great debasing industry.

The problem of checking this evil has been energetically taken up in some States, Massachusetts perhaps having done most to make hard the path of greedy evil-doers. As we recently stated in the PRESS, so strict is the surveillance kept of the retail stores of foods and drugs in the old Commonwealth that the Yankee skill in adulteration has to expend itself on articles for shipment to other States, as the danger is too great on home sales. The result is that the evil goods are shipped to other States where no particular attention is paid to the matter, and we have no doubt the Pacific Coast has its full share of these bad things to eat, drink and pay for.

Judging from the experience of Massachusetts and some other States, the true way to cope with the evil is for each State to equip itself not only with good laws on the subject, but with effective penalties and rewards and other executive machinery which shall carry the laws into effect. This each State must do for itself to meet the adulteration originating within its own borders. This State work should be supplemented by effort on the part of the General Government, and this will come before the present session of Congress, urged by organized support which will be rallied at a meeting to be held at Washington on Wednesday of next week. This meeting will call the attention of Congress to the great evil, and submit for its action a national anti-adulteration bill. The bill was drafted by the Commission, approved by the National Board of Trade, and was introduced in the last Congress, but owing to departmental jealousies, it did not become a law. Public opinion has again become so strong in favor of such a law that the convention will again recommend the measure, together with whatsoever amendments may seem judicious, and will urge its passage by the Fiftyeth Congress. The proposed Act, entitled "A Bill to Prevent Adulteration of Food and Drugs," is the result of much patient research by men of talent, who undertook their work for the National Board of Trade. Although the national Act has not yet become a law, another Act, drafted by the Commission on the same lines for enactment for the several States, has become a law in New York, New Jersey, Massachusetts, and substantially in Illinois and Michigan. It is evident that an Act applying to interstate transactions and commerce with foreign countries is needed. All States are, therefore, called upon to assist in this matter, and each State, other than the above, is petitioned to pass a State law in harmony therewith.

We have received a copy of the bill which will be reported and urged at the Washington meeting next week. It provides first for the establishment of a Governmental bureau to be attached to such department of the Government as Congress may see fit and to be called the "Bureau of Adulteration." It shall have a chief officer and a corps of assistants, analysts, etc., to carry out its work, which shall be in the main to furnish incontestable proof of the quality of articles of food or medicine which may be submitted to it or which it may obtain itself for examination. This bureau will thus furnish the evidence upon which all measures of prosecution, etc., must depend. The work of the United States in prosecuting evil-doers in this line must, of course, lie within the constitutional scope of the Government, and the prevention of adulteration, as proposed by the bill, is a somewhat roundabout proceeding. Thus, we find that outside the District of Columbia and the Territories, over which, of course, the General Government has direct control, the penalties are fixed against any person or corporation which moves adulterated articles from one State to another, because interstate commerce is open to Government regulation, or imports from foreign ports to any State, because all imports are regulated by the General Government. The bill provides that any party convicted of transgression in these ways shall be fined not more than \$100 for the first offense and not more than \$500, and be imprisoned not more than one year or both, for each subsequent offense.

Other sections of the bill provide for the examination of suspected articles, and arrange for re-examination of the material at expense of the suspect, providing he is not satisfied with the first examination of the article. The selec-

tion of local analysts whose testimony can be accepted, is also provided for. The district attorneys of the United States are ordered to prosecute offenders of this class, and are paid for their services by the United States Government.

The definition of food is held to be anything which is eaten or drunk, and adulteration thereof means (a) reducing its strength, (b), debasing it by introducing inferior material, (c), debasing it by extracting any valuable part, (d), introducing any unwholesome material, (e), coloring, coating or polishing so that a base article is made to appear like the genuine. These items are all described in detail in the Act. In the case of drugs, the offense lies in selling an inferior material under the name fixed by the U. S. Pharmacopoeia or any other standard work on materia medica, or if, when sold under another name, it differs from the standard of strength, purity, or quality therein; also, if, in these reports, it falls below the professional standard for such drugs.

Provision is made for frequent publications from the Bureau of Adulteration of the results of its examinations, and these will probably be quite as useful as the prosecutions in informing the people and in making the adulterators' business unprofitable.

There are a host of ways in which such a law will be of immense value to Californians, besides protecting us as consumers. It would force bogus wine-makers out of their arts, it would reach the hordes of olive oil adulterators, who, even in our own city, we are told, are traitors to the prosperity of our State by putting up false brands of olive oil, hoping to profit by their wretched dishonesty because California is becoming known as an olive country. The Act would also supplement effectively the arrangements for pure dairy products and do good in ways innumerable. We trust the matter will commend itself to immediate action by Congress.

## The Seven Devils' Country.

The following descriptive article is taken from the Walla Walla Statesman, whose editor, Col. Frenk Parker, is an old-time prospector in these rugged mountains, and who has faith in their mineral wealth:

Seven Devils mining district is situated in the middle part of the west edge of Idaho, eight miles east of the Snake river, about 90 miles south of and up the river from Lewiston, and about 100 miles north of and down the river from Weiser station on the Oregon Short Line, at an elevation of 6000 feet, back on the high, perpendicular bluffs of the wild and weird Snake river canyon. The general formation of the country is limestone and granite, and the course of the veins northwest and southeast. There are a number of locations in the district on good, strong veins, that run from 8 to 12 feet wide, some of them averaging the whole width, 50 per cent copper, 30 ounces silver and \$12 gold to the ton. Some of the locations—the Helena, White Monument and Peacock—were discovered 20 years ago, and are now patented. On the Peacock is said to be over 120,000 tons of high-grade ore in sight. Last year Lockwood and Frint sold the Mt. Queen and Blue Jacket to Bristow and Kleinsmith of Butte City, Montana, Ty., and Allen & Lewis of Portland, Oregon, for \$40,000. Steele & Co. of Portland own the Alaska and Deatur locations. The Helena Mining Co. own the Peacock, White Monument and Helena. All these locations and some others are fairly well developed, being opened by 100 feet and over shafts and drifts. The camp, says Pat. Hickey, who kindly furnished this information, will make the largest and richest copper camp in the world when a railroad is built to it and the mines worked. There is a good practical route for a railroad from Weiser up Weiser river 40 miles, on a grade not to exceed 20 feet to the mile, then 16 miles across a low divide on to Crooked river seven miles, on across a rolling prairie country six miles to Bear creek, up which it follows three miles, at a grade about 25 feet to the mile, and through an open, timbered, hilly country at about 30 feet rise to the mile, to the camp of Annie Bristow—named after the first lady that visited the country—in the center of the Seven Devils district.

The Union Pacific Company last summer ran a survey line for a railroad route from Weiser up Weiser river, across on to Little Salmon, down said stream to Big Salmon and on down to the Snake.

All up the Weiser river are little valleys in which are thousands of acres of fine agricultural land, and the surrounding country affords excellent stock ranges.

On the Weiser is the Middle valley, 4 by 10 miles in extent; Salubria valley, 5 by 17 miles; Council, 5 by 8 miles; Indian, 4 by 6 miles, and Hornet valley, 1 by 16 miles in extent. In these valleys and surrounding country the winters are mild and cattle run out and do well all winter without having to be fed.

Among the other promising camps is the No Business Canyon, situated about 20 miles south of the Seven Devils. Ed. Ryan of Boise City, W. Walker of Hornet valley, and another party, located last summer in this district a 20-foot vein, running northwest-southeast, in porphyry quartzite, which averages on the surface 30 ounces of silver and \$17 in gold.

The building for the Ramona Indian Girls' School at Santa Fe, N. M., commemorating Helen Hunt Jackson, will cost \$30,000.

## The Mines and Miners.

BY PEDRO CASTERA.

(Continued from issue of Jan. 7th.)

Translated for the Press from *El Minero Mexicano* by M. N. M.

## Was He Conscious of His Merit?

Perhaps not, but he evidently was of his vigor, of his intrepidity, of his nerves of steel, and of his indomitable will. The act of a fool, some will say. But who? Only the mean-spirited, the stupid, and the imbeciles. A dense smoke and suffocating heat was filling the bottom of the shaft. The air was rarified and charged with gases of sulphur and niter. The stones were falling thick around him. With the blood dripping from his wounds, and almost asphyxiated by the inhalation of the irrepressible gases, he stood there undaunted awaiting the remaining shots from the barrenos. The last three barrenos exploded with but a single echo, and even the respaldos, or walls, trembled under the disruption that took place. Among the auditors at the mouth of the shaft there was profound silence. Instantly the voice of the *pegador*, serene and more sonorous than ever, was heard crying out—*En los planes de Santa Rosa y—¡sin novedad!* Death often respects the valiant, and it had respected him. The enthusiasm was indescribable. The cable was lowered with a number of barreteros, and soon after appeared the blackened and blood-stained hero. The sun was sinking low in the distant west. Indubitably—upon such noble souls—in the blue of the skies—God looks down.

## In the Midst of the Abyes.

I do not recollect whether the actual occurrence, which I am now about to relate, took place in the mine de la Cata, or in the Rayas; both are in Guanajuato, and, if the reader will permit, we will refer it to the last. The general or usual shaft of the mine of Rayas, which measures 900 varas in depth and 16 in diameter, is classified by its dimensions as the first in the world. At the epoch to which we allude, they were working eight whims or windlasses in that tiro to drain the mine. The administrador of this mine was Don Rafael H—, about 30 years of age, pale, spare and feeble in appearance, but in whose look shone the flame of energy and the radiant spark of intelligence. The cajonero of the shaft was named Jose. He was a robust fellow, but with the hungry, suspicious and unquiet look of the jackal. The ropes for descending, the cables for drainage, the depot and everything pertaining to the shaft and its various services, were subject to his order and under his immediate direction. Among the *cosas* which the administrador possessed was a very pretty sweetheart of exquisite form, who had turned the head of the cajonero Jose, who, for a long time, had been simulating caresses and throwing side-glances at her. The girl, however, never failed to overwhelm him with disdain, and this is readily understood when it is known that between administrators and cajoneros the distance is as great as that between the mistress of the house and her maid-servant. The muchacha had declared herself a strong fortress and Jose her besieger; but the latter, tired of besieging, made, one day, an assault, which cost him

## A Good Cudgeling from the Administrador.

Jose submitted to the caning, but he swore to his master that he was going to have revenge. Don Rafael, however, despised such threats, and, as the attempted offense could not be regarded as one against discipline, the cajonero continued to hold his place. Some time after, the girl fled with a cavalry official, thus giving a proof of her constancy and invincibility. One morning Jose entered hurriedly into the room of the administrador, while he was sleeping, and told him that in the mine many shouts, songs and vivas were heard, and that surely they had found a bonanza. This word produces more effect on the imagination of the miners than all the cataclysmes and earthquakes together, and hence it was that Don Rafael, without waiting for the proper report, ran to the shaft, tied about his waist a sort of *mecapal*, to which has been given the name *caballo* (horse), fastened himself to a cable, and, suspending himself above that vast abyee, said to the cajonero, *¡arrea!* The horse of one of the whime began to move, and the cable being arranged, Don Rafael, with a lighted *hacha* (torch) in one hand and holding with the other to the cable, began to descend slowly into that black hole without observing that there was no noise in the mine, and that the cajonero had smiled in a sinister manner.

## When He Saw Him Begin to Descend.

Danger not only awakens the instinct, but quickens it, and the administrador, seeing himself suspended in the midst of the abyee, suddenly remembered the threats of Jose, comprehended that he had acted without due reflection, that his life was really on a thread, and that the cajonero could cut it at his pleasure. The torch showed the drops of cold sweat that were bathing his forehead, the convulsive trembling of his limbs, and the look of anguish that he fixed so quickly on the depth and on the lateral walls of the shaft. He had descended proba-

bly 100 varas, when the movement of the rope was stopped. Don Rafael felt a chill which penetrated to his marrow and seemed to congeal his blood. He realized it all. Jose was going to cut the cable from which he was suspended, and he would reach the surface of the water with greater velocity than that of a ball from a cannon. He glanced despairingly at the nearest wall, and was able to discover, fastened in it, a thick piece of wood that projected from the vertical edge one-half of a vara or a little more. To throw the *lea* to the bottom of the tiro, untie the *oaballo* from the rope and clutch with both hands the log, which appeared to him only a splinter, required but a few seconds, and he had hardly done so when he heard the descent of the rope and soon afterward the noise made by the fall of it in the water. The scream of terror which he emitted was replied to at the mouth of the tiro by a loud and sarcastic laugh, which, in spite of him, made him tremble.

## Then Profound Silence Reigned

And he remained submerged in the darkness, seated on that fragment of wood and wavering above the awful deep which was attracting him and which the least negligence would precipitate him into. The silence was broken only by the creaking of the ropes, by the drops of water from the drainage buckets, sometimes by the deafening report of the barrenos and by the echo of the hammers of the barrenadores—but soon, in the midst of those several noises, he distinguished one that made his hair stand on end from horror. The bit of wood on which he was seated began to crack. The air, the water and the passing years had rotted it, and it was giving way under the weight of his body. So far from being saved, as he had imagined, he had only managed to prolong his agony. Then he tried to hold to the wall of the shaft, but his nails were torn against the rock and his bleeding hands availed nothing in lessening his weight. Now he heard a mournful song which was coming from the depths of the shaft—it was the *alabado* which the miners sing when they know that a brother has died; *ayes* of anguish and despair which combine with complaints and sobs, forming in this way a melody sweetly sad and profoundly touching. The news of the death of the administrador had reached the barreneros and all the people of the mine, and they were singing the *alabado*, supplicating God for him. That song came to him like the psalmody at the threshold of the grave, a psalm of grief, foreboding the pangs of death, and that tomb in which he was about to be precipitated. The singing ceased, and to the rustling of the calabrotes that were moving up and down end to the sounds of the drops that were falling, was added that sinister crackling of the wood, which, like a pendulum, was marking his agony and the time of his departure. The frail support began to incline—Don Rafael held desperately to the rock. The blood rushed to his head and his temples throbbed painfully. In a few seconds, which to him appeared centuries, he heard the voices of the exulting miners at the mouth of the shaft.

(To be Continued.)

COAL AND GAS IN YUBA CO.—A dispatch dated Marysville, Jan. 12th, says: Several years ago Eli Davis, ex-supervisor of Sutter county, prospected for coal on his ranch in the region of The Buttes and was partially successful, but did not prosecute his discovery. At that time a small flow of natural gas was discovered coming from the ground when at the depth of 40 feet. Yesterday Mr. Davis bored on his place, near the town of Sutter City, and has discovered a strong flow of natural gas which he will immediately develop. He now says that experts will be employed to look for coal deposits.

RICH MINES SOLD.—A syndicate of wealthy New York capitalists have acquired the extensive smelters, stamp-mill and other reduction machinery located near Albuquerque, owned by the San Pedro Company. The new company will organize with a capital stock of \$1,000,000, and intend to enlarge the already extensive plant at the mines. The new company will be known as the New Mexico Milling and Smelting Company. These mines have been in litigation for several years past.

GOLD IN BOGOTA.—Las Noticias of Bogota, U. S. of Colombia, states that: "The gold which is now being dug out of the ancient cemeteeie (huacas) at Hilandia and other places near Pereira, in Cauca, has led more than 1000 workmen to flock to that spot, and a town has sprung up there within the past four years which now contains more than 5000 inhabitants."

LIGHTNING-RODS USELESS (?)—The *Electric Review* says that the uselessness of the lightning-rod is becoming so generally understood that the agents find their vocation a trying one. Fewer and fewer rods are manufactured each year, and the day will come when a lightning-rod on a house will be regarded in the same light as a horseshoe over a man's door.

THE San Bernardino Board of Trustees has accepted plans for a sewerage system for the entire city. The cost is nearly \$132,000. Waste land will be secured for a sewerage farm, in which the sewer system will empty, and the material be used as a fertilizer.





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SAN FRANCISCO

Saturday Morning, Jan. 21, 1888.

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## Passing Events.

For a week or more past we have had the coldest weather ever experienced in California. The cold wave has extended over the whole State, and in the mountainous regions has been felt severely. While California has had no such severe weather as the States and Territories east and north, great discomfort and inconvenience has resulted, since we here were unprepared for anything of the kind.

Most of the ditches and other sources of water supply in the mining regions have been frozen up of late, and many mills have been compelled to close down. At some mines, also, operations have been suspended owing to the cold weather. Great difficulty has been experienced in keeping the various railroad lines open.

In another column attention is called to the shipments of silver-lead ores into this country from Mexico, a very important matter to our lead miners, since these ores, owing to their silver contents, come in free of duty as silver ores. It is a subject which the lead miners will do well to pay some attention to.

There is very little news of moment from the mines. The cold weather prevailing of late has retarded operations considerably nearly everywhere.

The Northern Pacific railroad charges twice as much for carrying ores from Coeur d'Alene to Portland, Ogn., as it does to Wickes, Montana, and the Portland people do not like it. The railroad officers say the reason is "they have empty cars going East."

## The Duty on Lead and Lead-Bearing Ores.

To discuss the effect of reduced duties on imported wool, raisins or other agricultural staples would be foreign to the province of this paper. Leaving, therefore, that branch of the subject to be looked after by that portion of the press to which it properly belongs, it becomes pertinent for us to consider the consequences likely to result from placing the single article of lead or lead ore on the free list.

In the first place, it may be observed that we operate in this country no mines solely for the lead they yield. Our plumbiferous ores all carry more or less silver, generally enough to cover the cost of their extraction and subsequent treatment, and very often a great deal more. But, while this is the case, there occur throughout the Pacific States and Territories immense quantities of lead-silver ores, too poor in silver to warrant their being handled for that metal alone. If from any cause the price of lead were to depreciate below the point of profitable production, this large class of ores becoming valueless would be neglected; whence there would ensue a large curtailment not only of the product of lead, but also of silver; a result that, while it has not been wholly overlooked, has, it seems to us, hardly received the attention it deserves.

A large proportion of the so-called silver mines of Idaho, Colorado, Utah and Montana would be obliged to suspend operations but for the lead they yield. Destroy the market for lead and they would all have to shut down and so remain until the market for that metal was restored. Of course, many of these mines might be kept running by reducing the wages of employees to very low figures, were that practicable. In any event there would be left to the owners only the alternative of closing their mines or cutting down wages to the European or the Mexican standard, that is to say, about one-third the present rates. It must not be forgotten that there is, throughout all these countries, a sharp competition in the lead-producing business; so much so that many companies, during the past 10 or 12 years, have, by reason of the prevailing low prices, been forced to retire from the field, while others, possessed of more ample means, have been able to keep on and finally realize a fair profit only by storing their product and awaiting a better market. Pursuing this policy, the Richmond Consolidated Company have at times had whole shiploads of lead piled up at their mine in Eureka, Nev. The truth is, our lead producers, even with the protection afforded them by the present tariff, have barely been able to live; without such protection the most of them must suffer industrial and financial death.

As regards the admission of lead ores duty free, we have much to fear from our neighbor, Mexico, which, besides an incredible wealth of these ores, and her dangerous proximity, is a country of excessively cheap labor, the wages of miners being even less there than they are in the Old World. Through the facilities afforded by railroad transportation, the influx of these ores from that quarter is beginning to be large, as they escape the existing duty imposed on lead ores by being classed as silver ores. Argentiferous galena, if it contain as much as 30 ounces of silver, is passed through the custom-house at Paso del Norte, and presumably at other points of entry, duty free, being then accounted silver ore, even though the lead values may greatly preponderate. If the ore in its original state contains too little silver to rank as a silver ore, enough of the latter of a higher grade is added to bring the whole up to the requisite standard, and thus insure its entry duty free. Under this ruling of our custom officials, Mexican lead ores are practically placed on the free list.

A writer in the *Mining Review* calculates that as much as 2000 tons of this Mexican ore crosses the border every month, an estimate that appears to be fully warranted by the returns of the Bureau of Mining Statistics, which establish that ore importations from Mexico have nearly doubled every year since the completion of the Central railroad which traverses the great lead-bearing districts of Chihuahua, and in like manner crosses or runs near other plumbiferous sections of the Republic. Should these importations of Mexican lead ore be suffered to go on increasing at the rate they have been doing for the past few years, the injury

they must inflict on the lead industry in this country will be very serious, as the whole United States produces less than 12,000 tons of that metal per month. Clearly, home interest demands not only that the present duty on lead and lead ores be retained, but that the intent of this law be carried out in the matter of the importation of these lead-bearing ores from Mexico.

## Regulating the Working of the Mines.

While mining in the United States has grown to be a great and permanent industry, the business with us in some of its branches, especially those that relate to mining for the precious metals, is comparatively new. But it is in all its branches old enough to have been subjected to a somewhat more rigid system of public supervision than has yet been extended to it, these engaged in the business, whether private individuals or incorporated companies, having been left to prosecute it with but little interference on the part of the law-making power.

In view of the wasteful manner in which many of our mineral deposits are known to be worked, and the serious accidents that are constantly occurring, it may well be questioned if something like a code of mine regulations should not be enacted by the Legislatures of those States and Territories in which this business is largely carried on, provision being made for the appointment of inspectors to see that mining operations were being properly conducted, and that these regulations were properly observed. The rules in force in old mining countries, changed to suit circumstances, might, no doubt, be by us adopted to advantage, these being the results of long experience and having been tested by practical trial. These regulations should look not only to protecting the miner in life and limb, but also to preserving his health and insuring his comfort.

It might perhaps be best for the Legislature to appoint, or empower the Governor to appoint, a committee to prepare such code, care being taken, of course, that none but thoroughly competent men be selected for the service.

There are many reasons why mining, more than most other pursuits, calls for helpful legislation—many reasons why special precautions should be taken and special safeguards be provided in its behalf. The business, besides being somewhat new to our people, is inherently difficult and dangerous. The miner has to deal much with unstable elements and unknown quantities; to contend with water, foul air and deadly gases, doing most of his work at great depths, and also in the dark. If anything can be done to ameliorate his condition and insure for his calling larger and more certain results, it is important both for the miner and the general public that it should be done.

THAT ARIZONA GOLD MINE.—A dispatch from Prescott, A. T., dated Jan. 17th, says: Another immensely rich discovery was made yesterday in the Howard mine near here, which is fully as rich as the pocket discovery in the same mine some months ago. A gentleman who has just returned from the mine says that this discovery is, if indications can be relied on, a vein and not a pocket, as the first discovery was. After the discovery of the rich pocket, some time ago, the value of the ore decreased, but never less than \$30 per ton. This is a continuation of the vein, and at the bottom of the 40-foot shaft, and if it continues its fortunate owners will rival in wealth Gould and Vanderbilt.

A COLD PLUNGE.—The miners who are at work in the heated lower levels of our mines feel as though dumped down at the North Pole when landed in open air. The cold shrivels them like shrimps. A dash from 100 degrees above zero to an atmosphere almost down to zero is a big change to be made in the space of about three minutes. But that the men are pretty well prepared for the change and have a good supply of warm clothing on hand in their changing-rooms, the doctors would have their hands full of pneumonia patients.—*Virginia Enterprise*.

TWENTY tons of clean copper is now the daily product of the Copper Queen mine at Bisbee, Arizona.

## The Future of the Copper Industry.

The high prices now prevailing for copper are likely to greatly stimulate the production of that metal the world over. While such is the case, the increment on the Pacific Coast is likely to be immediate and more marked than elsewhere, because here the deposits of that ore are exceptionally numerous and of more than average high grade, and because many of them, being already opened and equipped with plant, are in condition, or can soon be put in condition for active production.

We have, on this coast, especially in California and Arizona, many mines so developed and outfitted, and which suspended operations simply because the price of copper had dropped to a figure too low to warrant their continuance. Of these companies, some have already resumed work, while others are making preparations and will soon do so. It may be expected, therefore, that the output of copper will, in a short time, reach large dimensions, bringing about again, after a time, lower prices.

The probability of such result has caused some to question the policy of such hasty and general resumption of production, citing our experience in quicksilver mining as affording warrant for their apprehensions. But that experience can hardly serve as a precedent in copper mining, the nature and conditions of the two industries being so little alike.

In the case of quicksilver the deposits, at the time the then prevailing high prices so stimulated mining for that metal, were with few exceptions in a virgin state, being undeveloped and without plan. A great deal of money had therefore to be expended before these deposits could be brought into a condition of active production. With our copper mines, as before remarked, the case is quite different. They are for the most part ready to resume operations or can do so at short notice and with very little preliminary expenditure.

Then, in the case of copper, if prices decline consumption is increased, enlarging the demand for the metal and tending to maintain the market. With quicksilver it is otherwise; being confined to a few uses, a reduction of price does not tend to much increase the consumption of that metal, and so the producer is left with nothing to compensate him for such reduction.

WATER GAS.—In his annual report Mr. Joseph Crockett, the president of the San Francisco Gaslight Co., says that besides improvements made during the past year the Potrero works are yet to receive the addition of the Springer patent for water gas, which will be in running order by July 1st, with a capacity for furnishing 2,000,000 feet of water gas every 24 hours. This improvement, including the cost of the company's seven-tenths' interest in the patent, will foot up a total expense of \$95,000. President Crockett expresses great faith in the project. The remaining three-tenths' interest in the patent belong to the other local company, and the value of the entire patent is estimated at \$50,000. President Crockett says that the past is the most prosperous year the company has had since 1880. During the year the company employed permanently and temporarily 445 men, and the entire payroll aggregated \$385,826.

CRESTED BUTTE COAL.—Edward E. Chever of this city, now visiting Colorado, has sent to the State Mining Bureau from Crested Butte, Gunnison county, Colorado, a splendid specimen of anthracite coal. He writes us that the U. S. Mint at San Francisco is now using this coal. Mr. Chever had to pay \$15 express charges on the 100-pound lump of coal from Denver to S. F., but he writes: "We may hope for a time when the fruit and wines of California may supply the wants of Colorado and her deposits of fuel furnish return freights in exchange. There were 16,242 cars of coal, coke and ore shipped from Crested Butte during the past year."

THE verdict of the jury in the patent boiler-furnace suit of E. W. Tucker vs. John Birmingham in the United States Circuit Court was in favor of plaintiff, with damages assessed at \$200.

THE Mexicans are objecting to Americans coming into their territory, much as the Americans object to the Chinese coming to this country.



### Electro-Magnetic Apparatus for Separating Ores.

Jacob Kessler of Ober Lahnelein, Prussia, has patented in Germany and in this country an improved electro-magnetic machine for separating particles of iron from ore. The invention consists in the combination, with a drum which is magnetized by an electro-magnet connected with a suitable battery or dynamo-electric machine, of an endless belt or carrier passed around the drum, and provided with pins, which are passed through the pulverized ore, the particles of iron adhering to the pins which are magnetized, and which pins are then demagnetized, causing the particles of iron to drop from them.

In the accompanying drawings, Fig. 1 represents a longitudinal sectional elevation of the improved electro-magnetic machine for separating ores. Fig. 2 is a sectional plan view. Fig. 3 is a face view of one of the endless carriers or belts carrying the pins, and Fig. 4 is a cross-sectional view of a modification of the machine. Similar letters of reference indicate corresponding parts.

On a suitable shaft the spider arms or frames, *f*, preferably made of brass, are fastened, and on the same the cylinder, *e*, made of sheet or cast iron, is fixed, which cylinder is surrounded at its middle or at the ends by an insulated wire coil, *h*, forming an electro-magnet, the ends of the coil being connected with a battery or dynamo-electric machine, the coil being fixed and the drum or cylinder revolving in the same. At the sides of the coil endless belts, *K*, are passed over the drum, *e*, and over a wooden roller, *m*, at some distance from the drum, *e*. The endless belts consist of the straps, *s*, united by transverse strips, *k*, of metal, from the outer sides of which the iron pins or pegs, *k*, project, as shown in Fig. 3.

For the purpose of preventing the magnetization of the strips *K* after they have been passed over the drum, some of the strips *k*, at suitable intervals, are made of brass.

The pulverized ore is put into a hopper, *d*, having an inclined bottom, at the lower edge of which the sliding door *o* is provided, and below the door a gutter, *n*, is arranged, in which an agitator, *p*, is mounted to revolve, this agitator being driven from the shaft of the drum *e*. The agitator, *p*, throws the pulverized ore from the gutter into a guide, *r*, which is arranged in close proximity to the endless belts *K*, so that the pins *k* of the belt pass into the pulverized ore in the guide *r*. An inclined partition, *q*, is held adjustably below the drum *e*. The pins *k* are magnetized as they pass over the drum *e*, and as they pass through the pulverized ore attract all the particles of ore, etc. The pulverized ore drops into the partition *q*, and slides over the same into the compartment *z*, whereas the particles of ore that adhere to the pins *k* are carried over the top of the partition *q* and drop into the compartment *x* as soon as the pins lose their magnetism, which takes a greater or less distance from the drum *e*. The partition *q* is so adjusted that its upper edge is near to the point where the pins begin to lose their magnetism.

In the construction shown in Fig. 4 the endless belts are replaced by a brass ring or roller, *t*, from which pins *k* project, said ring resting on the drum *e* and on the wooden roller *u*. For smaller machines the pine *k* may be replaced by permanent magnets, and in these machines the drum *e* and the wire coil forming the electro-magnet on the same may be dispensed with. The operation is similar to that of the machine shown in Fig. 1. If desired, the roller *t* may be provided with an axle in place of resting on the drum *e*. This apparatus differs in several features from those formerly made to accomplish the purpose.

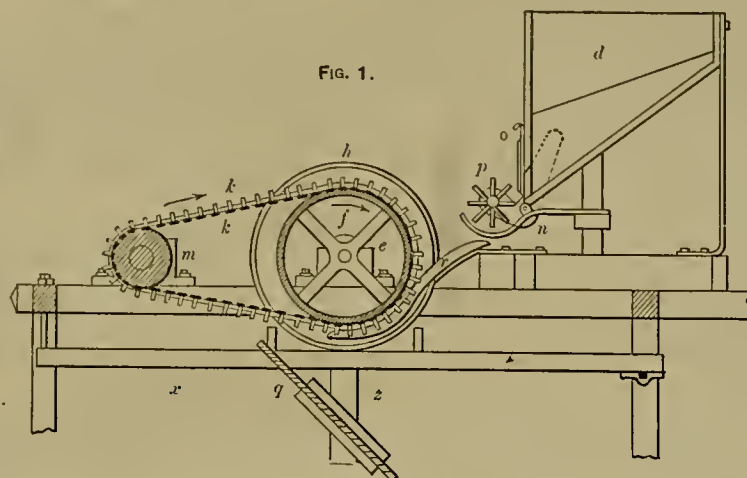
The severe and unusual cold on Mount Hamilton has delayed the work of completion of the Lick Observatory. The snow has been growing deeper and is now fully two feet on a level, and the weather is intensely cold. Saturday night the thermometer recorded 6°. The lowest temperature previously recorded on the mountain since the observatory work began was 13°.

The Walla Walla Statesman states that the nickel mine discovered six miles south of Rye valley yields from 40 to 100 pounds of nickel to the ton of ore. The ledge is very wide, fully 50 feet between walls at a depth of 100 feet,

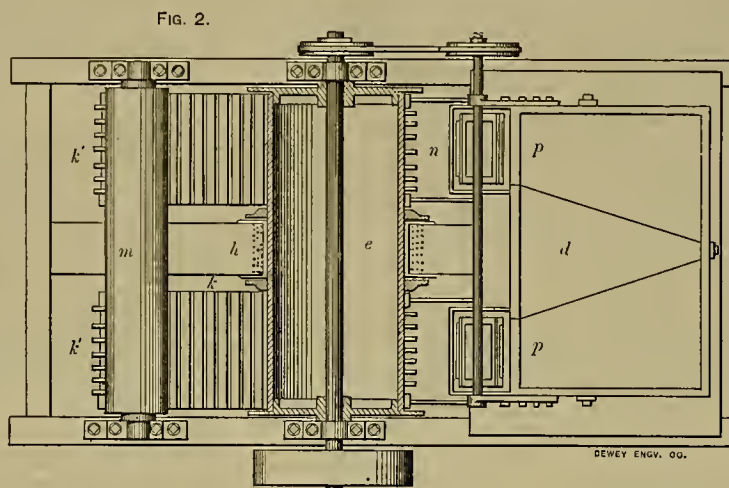
THE LATE W. W. HANSCOM.—On Monday last W. W. Hanscom, the well-known mechanical engineer of this city, died suddenly from congestion of the lungs. Mr. Hanscom was formerly one of the proprietors of the Etna Iron Works, and also started the Hope Iron Works at the Potrero, being the first of

matters connected with his profession. He has contributed more or less to the press and to the proceedings of the societies to which he belonged.

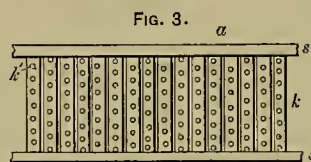
OUR MINING REVIEW.—The next number of the MINING AND SCIENTIFIC PRESS will contain



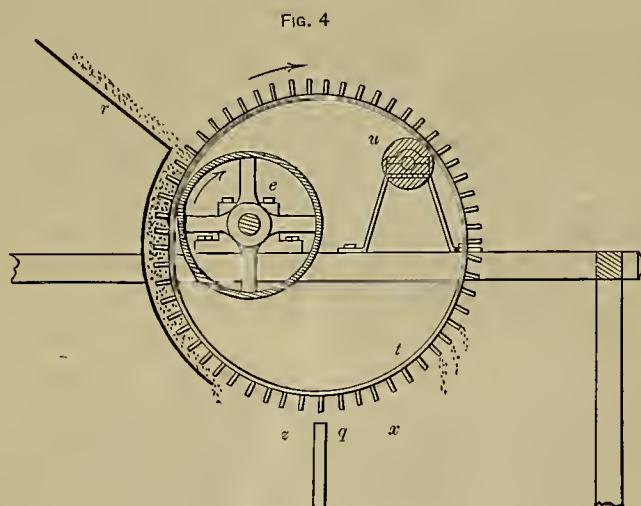
Sectional Elevation of Electro-Magnetic Machine.



Sectional Plan.



Face View of Endless Carrier.



Cross Section of Modification.

### ELECTRO-MAGNETIC APPARATUS FOR SEPARATING ORES.

the foundrymen to move in that direction. Of late years he has devoted much time to cable railroads and railroad brakes. For a year or more past he has been working on an air-brake system, which was satisfactorily tested on the Donahue road. Mr. Hanscom was an old resident of California and was the second son of Naval Constructor Hanscom, who was, in Farragut's time, stationed at Mare Island Navy-Yard. Mr. Hanscom was an educated mechanical engineer, an inventor and a student of

a review of the mining industry for 1887. It will comprise a large amount of statistical information concerning the mining interests of the Pacific Coast States and Territories. The whole will appear in a condensed form and be suitable for reference. The number will be one which will be valuable for all who are interested in mining matters.

THERE are three 60-ton stacks in blast at the mines of the Arizona Copper Co.

### Pectolite in California.

[A paper by H. G. HANES, read at the meeting of the San Francisco Microscopical Society Jan. 11th, and furnished for publication in the MINING AND SCIENTIFIC PRESS.]

I have the pleasure this evening to exhibit a mineral from a new California locality. This very interesting mineral is pectolite, a hydrous silicate of lime and soda. When pure it has the following composition:

Silica.....	52.5
Lime.....	36.1
Soda.....	8.0
Water.....	3.4
Total.....	100.00

As generally found, it is impure from the accidental presence of other substances in small proportions, as potash, alumina, magnesia, fluorine and oxides of iron and manganese, but these may be regarded as foreign to the composition of the mineral.

The various published analyses of pectolite differ very considerably, as do also the hardness and specific gravity.

Alumina is generally present in varying proportions from a trace to as much as five per cent.

There are several varieties of this mineral to which special names have been given as follows: Osmelite, phonolith, ratholite, stellite, wollastonite and walkerite.

Pectolite was first discovered and described by Von Kobel in 1823, who gave it the name "pektolith," derived from two words, Greek and Latin, signifying a comb and a stone, suggested by its peculiar structure and appearance. The first specimens were found on Mount Baldo, near Verona, South Tyrol, Austrian Italy. It was associated with natrolite, a mineral resembling it, except that lime is replaced by alumina, and the proportions of the other constituents differ.

Pectolite is rather a rare mineral, having been heretofore found only at the above locality, at Mount Monzoni, also in Tyrol, at Storö on the Isle of Skye, at Kilsyth and other localities in Scotland, at Wolfstein, Rhenish Bavaria, on Isle Royale, Lake Superior, at Bergen Hill, New Jersey, and recently at several localities in California.

The variety osmelite is found at Wolfstein. It is columnar and radiated; color, grayish-white to yellowish-gray. It has been proved by analysis to be identical with pectolite.

Stellite was first found and named by Thompson, near Kilsyth, Scotland. It is described as being tough, and resembling asbestos or nemalite, but radiating from several centers; some divergent fibers afterward found at Ayrshire, Scotland, are a yard in length.

This variety has since been found at Bergen Hill, New Jersey, which is now a famous locality. The radiated appearance of this variety suggested the name stellite; from *Stella*, a star.

Wollastonite is often confounded with pectolite, but it is entirely a different mineral, being a silicate of lime without soda, and is nearly anhydrous.

Walkerite is a name given to a mineral found near Edinburgh, Scotland, in radiating and interlacing fibers, of a cream color; being supposed to be a new species, it was named after Dr. Walker, an English mineralogist, but more careful study and analysis show it to be a variety of pectolite.

The first notice of pectolite in California that I am aware of appears in the Fourth Annual Report of the State Mineralogist, where Mr. C. H. Aaron is credited with finding a single (doubtful) specimen in a boulder at the foot of the White mountains in Mono county.

In the early part of 1887 a beautiful, translucent, nearly white rock, was discovered in Tehama county, in township 25 north and range 7 west. It was seen and examined by Prof. Wm. P. Blake, who was in the State at that time, and was pronounced pectolite by him. He was of the opinion that it would prove a valuable ornamental stone. To test its value as such, a sample was given to Mr. Mannel Laine, an expert lapidary of this city, who sliced and polished the specimens I have brought this evening to show you. It proved to be rather a pretty stone, resembling some of the Chinese jades. It takes a high polish but lacks character. It is no way more beautiful than aragonite, and is much more difficult and costly to work. Mr. Laine thinks there is no place in the catalogue of semi-precious or ornamental

(Continued on page 44.)



## MECHANICAL PROGRESS.

## Changes in the Fiber of Iron which it is Impossible to Detect.

The numerous accidents which have occurred during the past few years in railroading have been made the matter of most serious study by both engineers and mechanics. It appears that a large proportion seem to have occurred by reason of some unsuspected defect in the iron of the rails or wheels or in that of bridges. This defect is generally supposed to have been induced by some changes in the fiber of the iron after it has been put in its place. An exchange comments upon this matter as follows:

Crystallization in the material of iron bridges is an element of danger now so well recognized that the Pennsylvania Railroad Company has adopted the definite policy of substituting stone for iron bridges, and the same plan is being followed by other railroad companies.

The lifetimes of an iron bridge is from 20 to 25 years, and constant care is necessary to insure its safety. The Ashtabula bridge was 13 years old, and at the time it fell beneath the weight of two engines and a heavy express train the theory was commonly advanced that crystallization had impaired its original strength. The two great moving causes of crystallization are vibration and the hammer-blow of the locomotive, which gradually, by repeated impact, turn the fiber of iron or steel into a mass of crystals, needing only some unusual pressure or blow to cause them to break apart. Add to this the oscillation caused by the passage of trains at a high rate of speed, and it will be seen that an iron bridge is exposed to peculiar perils, which can only be guarded against by rigid inspection and constant renewals.

Crystallization was one of the several theories advanced by Park Benjamin, a New York engineer, to account for the Tay bridge accident. He said: "General indications go to show that the cause must be sought in an abnormal condition of the structure, or rather one which did not enter into the calculations of the builders. Such a condition would be the deterioration of the metal by its change from a fibrous to a crystalline state under repeated vibration. That this occurs in railway bridges has been vigorously disputed by many well-known engineers. On the other hand, many examples are quoted by different authorities to support the theory. Apropos to this particular accident, a distinguished French engineer and iron founder, now in this country, informs us that he has known bars of iron made by himself from Scotch pig to change from a tough fibrous to a brittle crystalline structure in traveling by rail only from the north of France to Paris. This is, of course, an extreme instance."

"Again, recent research has demonstrated that because a structure withstands a large quiescent load that fact is little proof of stability under repeated shocks and vibrations. Metals are believed to have a 'life.' A bar, for example, may stand a million vibrations and break down at the million and first, and yet the last shock may be lighter than preceding ones. Attempts, however, to reduce this law to practical application have elicited an abundance of conflicting evidence; but, nevertheless, it is well settled that in no department of mechanics is an extended course of actual experimenting more urgently needed or of graver public importance."

The strength of the Tay bridge at the time of its building was pronounced perhaps the most remarkable of any in the world. *Engineering*, a British magazine, speaking of its test, when five engines, weighing 360 tons, were placed on a single span, said: "The result is the complete establishment of this fact (so important to the public) that this bridge is strong out of all proportion to its possible necessities. As a matter of fact, the load which the structure is calculated to carry is six times greater than that to which it was subjected."

And yet this great bridge, which cost \$1,750,000, collapsed within a few months after it was finished, the accident being the only one in all railroad history in which no survivor lived to tell the tale.

The theory of crystallization put forward at the time of the Ashtabula bridge disaster is now accepted as accounting for many railroad accidents, and seems peculiarly applicable to the fall of the Bussey bridge. Vibrations and hammer blows would seem to have crystallized some portions of the structure and prepared it for a fall when at last the "life" of a girder had been exhausted and it broke beneath the engine's thumping driving wheels.

## Steel Tempers.

The number of tempers to steel is infinite, but the following is a list of the most useful:

Razor temper ( $1\frac{1}{2}$  per cent carbon).—This steel is so easily burnt by being overheated that it can only be placed in the hands of a very skillful workman. When properly heated it will do twice the work of ordinary tool steel for turning chilled rolls, etc.

Saw-file temper ( $1\frac{1}{2}$  per cent carbon).—This steel requires careful treatment, and, although it will stand more fire than razor steel, should not be heated above a cherry-red.

Tool temper ( $1\frac{1}{2}$  per cent carbon).—The most useful temper for turning tools, drills, planing-machine tools in the hands of ordinary work-

men. It is possible to weld cast steel of this temper, but only with the greatest care and skill.

Spindle temper ( $1\frac{1}{2}$  per cent carbon).—A very useful temper for circular cutters, very large turning tools, taps, screwing dies, etc. This temper requires considerable care in welding.

Chisel temper (1 per cent carbon).—An extremely useful temper, combining as it does great toughness in an unhardened state with the capacity of hardening at a low heat. It is consequently well adapted for tools when the unhardened part is required to stand the blow of a hammer without snipping, but where a hard cutting edge is required, such as cold chisels, hot sets, etc.

Set temper ( $\frac{3}{4}$  per cent carbon).—This temper is adapted for tools where the chief punishment is on the unhardened part, such as cold sets, which have to stand the blows of a very heavy hammer.

Die temper ( $\frac{3}{4}$  per cent carbon).—The most suitable temper for tools where the surface is only required to be hard, and where its capacity to withstand great pressure is of importance, such as stamping and pressing dies, boiler cups, etc. Both the last two tempers may easily be welded by a mechanic accustomed to weld steel.

**IMPORTANT IMPROVEMENT IN DOOR LOCKS.**—An important departure in door-lock furniture has been made by Mr. Abraham Wilks, Bloxwich, England, which overcomes the ever-recurring difficulty of loose door-knobs. The necessity for screwing the knobs on to the spindle is wholly obviated by the circumstances that the spindle is made in two equal parts, being split longitudinally, and to each half is fixed the knob by being cast in, hard soldered, or screw riveted. On the end of one of the spindles opposite to where the knob is fixed is a series of teeth after the manner of a blind-ratchet, and at the opposite end of the other spindle a tough laminar spring, which is riveted on, projects from underneath the knob, which, when the two halves are passed through the door, fixes itself into the teeth on the corresponding half, and the spindle being pressed home at once becomes immovably fixed. No treatment can wrench off the knobs, and the maker and the patentee are confident that they have effectually overcome a constantly recurring difficulty. The spindles and the spring are of steel.

**TEXTILE MACHINERY IN JAPAN.**—No one can read the reports of Her Majesty's consuls, remarks the *Textile (Eng.) Recorder*, without being struck with the opportunities that are presenting themselves in countries hitherto known as consumers of manufactured goods only, for textile machinery to do a large and profitable business. This at the present time is especially the case with Japan, and makers of textile machinery and appliances of every description should at once devote special attention to the capabilities of that country for trade. Much has been written respecting German competition with our textile manufacturers in Japan; but after all, while this competition must not be ignored, it has not yet materially affected our trade. There are, however, competitors far more dangerous than the Germans—even the Japanese themselves. In the limited space of a short article it is not possible to enter into details, and two or three facts must suffice to justify and corroborate the assertion.

**NEW INVENTION IN CALICO PRINTING.**—A correspondent writes to the *British Mercantile Gazette*: "The 'simultaneous' process of color printing promises to entirely revolutionize some classes of calico, velvet, and velveteen printing, and also the printing of advertisements in colors. The novel character of the 'simultaneous' process will be at once understood when I mention that by it, if required, 1000 shades could be printed off at one impression. Instead of using engraved rollers as in ordinary calico printing, or stones, as in the case of colored advertisements, the designs of pictures are 'built up' in a case of solid colors specially prepared, somewhat after the style of mosaic work. A portion is then cut or sliced off about an inch in thickness, and this wrapped round a cylinder, and the composition has only to be kept moist, and any number of impressions can be printed off on calico, velvet, or velveteen, the colors being thoroughly 'fast.'"

**A PROTECTING DEVICE.**—A device for protecting factory operatives from accident, by being caught by swiftly running wheels and shafts, has been devised by a New Haven man. It consists in winding shafts between pulleys with strings, spirally and rather loose, and then inclosing the shaft in zinc or tin or other metal cylinders. The strings simply prevent any noise from contact of the shaft with the metallic cylindrical jacket. Should a woman get caught by the hair, it would begin to wind up on the jacket, which would instantly stop its motion, leaving the shaft inside to revolve, but without doing harm to whoever might be caught.

**AN AIR METER.**—The Lowe Manufacturing Co., Norristown, Pa., offers \$10,000 for any satisfactory invention of a meter that will correctly register atmospheric air, from a holder under a pressure varying from one-eighth to one pound per square inch. There may possibly be here a good chance for inventors; but how is it with the numerous meters used for that purpose by the various scientific bodies? The world has never heard of any special complaints of inaccuracies in the instruments used by them.

## SCIENTIFIC PROGRESS.

## The Three Forces—Physical, Vital and Psychic.

[NG. 15.]

[Written for the PRESS.]

Naturalists are all in agreement with regard to the fact that every articulate animal is composed of homologous segments.\* Prof. Huxley, as quoted by Spencer, says that "a striking uniformity of composition is to be found in the heads of, at any rate, the more highly organized members of these four classes, and that, typically, the head of a crustacean, an arachnid, a myriapod or an insect is composed of Six Somites

(Or segments corresponding with those of the body) and their appendages, the latter being modified so as to serve the purpose of sensory and manducatory organs."

With the exception of the myriapods, he also finds among these groups the further unity, that in most of them the entire animal contains 20 of the homologous segments. Observe that here, for the first time, we have

## Homogeneities

Holding throughout an entire sub-kingdom; in the mollusks the colonial nature was heterogenic, clustering and branching. Among these animals in which no single egg produces several individuals, no individual is separable into several homologous divisions, the converse condition to that obtaining in the annulosa, considered as a group.

The segmented appearance of certain mollusks, the *chiton*, for instance, is only adaptive—has a functional derivation—it is not genetic, being only "shell-deep."

## Retrograding Forms. †

A well-marked example of the retrograding (or degeneration) in articulate animals can be seen in the common mite and in the tick insect. From the same root-stock as the spiders and scorpions (arachnida) have these originated; while the former have degenerated into parasitic forms, the latter have advanced in heterogeneity of organization. One familiar example is the *Demodex folliculorum*; this mite inhabits the follicles on the sides of the human nose, buried in the skin. Parasitism has deprived it of every apparent characteristic of the arachnida; it is a minute worm-like animal, possessing eight degenerated rudiments of legs, and a thoroughly rudimentary structure in other respects. The case of the

## Sea Squirt

Is stranger still. At maturity, it is merely a rooted bag, with a double neck; its larva was free swimming and tadpole-like; it possessed sense organs and a breathing sac—above all, it had the *notochord*, that rod-like body which is the forerunner of the spinal column in the vertebrates, as seen in the *Lancelet*. This little fish, the lowest of the vertebrate, as contrasted with the degenerate sea squirt, is the best example he can bring forward of development, as compared with retrogression.

The young sea squirt, in addition to its backbone and nervous system, possesses a modified throat leading to the breathing sac; its head is provided with suckers which become fastened to some object. This is followed by a loss of the tadpole-like tail; its nerve chord disappears, it assumes a sac-like form, the outer skin becomes tough and leathery, and develops *cellulose*, which biologists will tell you rightly belongs to vegetables alone. The breathing sac becomes more fully developed; the other compartment of the body receives the water used in respiration; this is ejected through the second mouth. The eye of this miserable youngster being no longer necessary, likewise disappears.

\*Copies of the diagrams used by Prof. Huxley at his lectures illustrating this point are given in Vol. II, p. 101 of Herbert Spencer's "Principles of Biology" (Appleton's reprint).

(To be Continued.)

## Porosity.

Porosity differs in degree among solids, and penetrability differs among liquids; as, for instance, coal oil is very penetrating. Sometimes coal oil appears to have gone through the pores of a receptacle, when it has only followed its surface by capillary attraction.

Porosity is shown to exist in the stones taken from the greatest depths of the ocean, as they are penetrated to their very centers by the water.

"Sir John Herschel asks why the atoms of a solid may not be imagined to be as evenly distributed through the space it occupies as the stars that compose the nebulae, and compares a ray of light penetrating glass to a bird threading the mazes of a forest."

One practical illustration of porosity is seen in the filter by which we take out from water intended for domestic purposes the various matters, organic and inorganic, with which it is contaminated. The action of a good filter is not purely mechanical. It is not merely a strainer. Such a material as charcoal has the power of condensing in its pores gases to the extent of very many times its own volume; and within its tiny cells there is an oxidation of putrescent and putrid matters, rendering them harmless even if passed over and taken into

the system. One thing must be remembered in connection with filters; they always require to be cleaned out at specified times; the frequency depending upon the foulness of the water, nature of the filter, and the amount of water which has been passed through.

The filter which requires neither cleaning nor rinsing is of no use as a filter. In some filters, the substances employed are sand or something of that kind which may be stirred up by mechanical means or by a current of water, so that whatever has been taken from one lot of water may be removed by another. In this material is good to use over and over again. In others, charcoal or a similar substance is used, and condenses and holds within its pores the foul matter; in which case the filtering material must be discarded.

## Progress of Electric Lighting.

A good idea of the progress that has been made in electric lighting in this country within a few years past may be formed by the following facts: "Of 150,000 carbons burned daily in the electric lights used in the United States, 100,000 are manufactured in Cleveland, Ohio. Six years ago all the carbons burned in this country were made in a single room in Boston. Now there are 20 carbon furnaces in Cleveland, alone. The carbons are made chiefly of the residuum of oil after it has been refined, but the deposit about natural gas wells is also coming into use. The material is ground to a powder, a little pitch is added, and the substance is then placed in molds. These are packed in boxes and the latter placed in a furnace, where they are subject to the most intense heat. The capacity of an ordinary furnace is 45,000 carbons."

It is said that the number of electric light plants in the 13 principal towns of Germany has increased during the last two years from 131 to 604; the number of arc lamps has increased from 591 to 3280, and the number of incandescents from 10,403 to 50,469. This number of gas lamps in these 13 towns is 1,221,882, and therefore, lamp for lamp, electricity furnishes about four per cent of the total illumination.

**THE FIRST LIGHTNING ROD.**—If we are to believe an Austrian paper, says *La Lumiere Electrique*, the first lightning rod was not constructed by Franklin, but by a monk of Seuttenberg, in Bohemia, named Prokop Divisch, who installed an apparatus the 15th of June, 1754, in the garden of the curats of Prenditz (Moravia). The apparatus was composed of a pole surmounted by an iron rod supporting 12 curved up branches, and terminating in as many metallic boxes, filled with iron ore and closed by a boxwood cover, traversed by 27 sharp iron points, which plunged at their base in the ore. All the system was united to the earth by a large chain. The enemies of Divisch, jealous of his success at the court of Vienna, excited the passions of the locality against him, and under the pretext that his lightning rod was the cause of the great drought, they made him take down the lightning rod which he had utilized for six years. What is most curious is the form of this first lightning rod, which was of multiple points like the one which M. Meisen afterward invented.

**HEAT FROM LIQUID FUEL.**—Naphtha, which is burned in locomotives in the Caucasus, yields 90 per cent of its theoric heating power, while not more than 60 per cent can be realized from solid fuel. Petroleum is now the sole combustible of ships in the Caspian sea, and only half as much is required as was formerly used of coal. The maximum force obtainable from coal is said to be only two-fifths of that which petroleum may furnish; and naphtha will take the place of 8½ times the weight of wood.

**SCIENCE VS. SUPERSTITION.**—The French Academy of Sciences has received a novel work by Messrs. Charcot and Richet, giving for scientific study a collection of representations of persons who have been "possessed of the devil." Various old masters of art are found to have faithfully depicted these subjects in ivory, enamels, tapestries, engravings, paintings and the like, their figures accurately reproducing the traits of the now well-understood states of epilepsy and other nervous affections.

**A SCIENTIFIC PRODIGY.**—It is said that a lad 14 years of age, now living on Boston Bay, who has long been celebrated for his knowledge of ornithology, natural history and chemistry, has now turned his attention to microscopy and bacteriology. Several scientists who have visited him lately pronounce his knowledge and research to be simply marvelous.

**DEATH IN BURNING BUILDINGS.**—The London *Lancet* doubts that persons who perish in burning buildings suffer as much as has been popularly supposed. The victim is generally made faint and pulseless by the carbonic acid or carbonic-acid gas, and becomes insensible before the fire reaches him.

**THE SITE OF ANCIENT BABYLON.**—The sum of \$8000 has been raised to enable Dr. Peters to continue the work of a thorough exploration of the site of ancient Babylon. Important revelations are confidently expected for this work.

**THE EARTH'S CURVATURE.**—The curvature of the earth is such that a straight line one mile long would be 2.04 inches from the surface at either end.



## Coast and Geodetic Survey.

The office at Washington of the Coast and Geodetic Survey has well advanced the engraving of a general chart of the Pacific Coast from Mexico to British Columbia, in two sheets. This will replace the former chart in three sheets. In the preparation of this chart it was very important to have the ocean shore line very accurately delineated, even before the triangulation and detailed topography are finished. For this purpose Messrs. Pratt and Morse made the topographical reconnaissance of the coast from Gray's Harbor to Cape Flattery, fixing the dangerous rocks which border the coast from Cape Greenville to the Strait of Fuca. This was successfully accomplished under many and great difficulties. South of the Columbia river Mr. Rockwell made a topographical reconnaissance between Tillamook bay and the Yaquina Headlight house. This season at the north was very adverse, and the country was very rough and rugged. From the mouth of the Yaquina bay to the Umpqua, Mr. Dickens finished a similar survey, then commenced at Ten-Mile river, north of Coos bay, and made the topographical reconnaissance to Blacklock point, just north of Cape Orford. These were very important additions. Smoke, fog, and rain retarded the work somewhat, and some of the headlands have not trails.

On the Southern Coast Messrs. Rogers and Winston have finished the tertiary triangulation of the coast from Oceanside to the old work at San Diego, and also the accurate delineation of the shore line from near Point San Mateo to False bay. On account of the great development of improvements in the region of San Diego bay, Mr. Rogers made a complete resurvey of the shore line to detect changes therein, and also plotted the new and extensive wharves which have been built in San Diego bay, and the positions of the buoys from the bar to the head of the bay. A complete hydrographic survey of the bay is being made by the city of San Diego, and when this is finished and the currents accurately measured there will be good material to discuss the physical and hydraulic questions to which the building of wharves has given rise.

On that wild and precipitous part of the coast north of Piedras Blancas Light-house Mr. Forney has been engaged in the necessary triangulation and topography to fill in a very important gap hence to Point Sur. This stretch of 50 miles of coast is the boldest by far of any shore from Panama to the Arctic ocean, while broad off the depth of the ocean reaches more than 2000 fathoms within less than 40 miles from the shore.

All the material accumulated by these topographical parties will be utilized in the coming charts. A special hydrographic examination has been made of the San Juan Capistrano anchorage; of the head of the deep submarine valley off Newport bay; of the 17 foot rock in La Bolla.

One topographical party yet remains in the field. Messrs. Sangteller and Wilkes are engaged in the resurvey of San Juan bay, and are now surveying Montezuma slough and the channels to Denverton and Suisun.

The party under Mr. Gilbert has been at work during the season in Washington sound, and has finished the shores of Bellingham bay and the adjacent waters. Mr. Pratt has been for part of the season continuing his former survey from Possession sound.

The main triangulation to connect and strengthen the scheme across the continent with that upon the Pacific Coast under the direction of Professor Davidson, has been successfully carried forward by Messrs. Lawson and Morse, who have occupied Mocho mountain, in Alameda county, 3860 feet high, and observed upon stations in the Sierra over 120 miles distant and as much as 13,000 feet elevation. They have also observed for latitude and for azimuth.

All the parties are now at work in the snob-offices reducing the field observations obtained during the past season.

**LOS ANGELES MINES.**—An Acton correspondent of the Los Angeles Times says: There are about 20 of the best gold mines of Southern California located at this point, which is 30 miles due north of Los Angeles, on the Southern Pacific railroad. Among the principal mines can be counted the Red Rover, Topoka, New York, Little Blue Eye, St. Paul, King of the West and Union. There are many others. The gypsum mine is located about ten miles west, and two stamp-mills are running day and night. Three more stamp-mills are to be erected here. More interest is taken in the mines here in the last few months, and lively times are expected in February and after.

The lumber product of the Emigrant Gap mills this season amounts to 5,000,000 feet. Of this amount Towle Brothers have cut 2,500,000 feet; Carlin, 1,500,000 feet; and Geisendorfer, 1,000,000 feet.

The Truckee Lumber Company purchased nearly a million feet of lumber from Geo. Schaffer, which will be sufficient to keep the box factory running all winter.

There are more snowbirds in Virginia City this winter than ever before.

## USEFUL INFORMATION.

## Our Foreign Trade in Wood and its Manufactures.

We give below the extent of our foreign trade in wood and the manufactures there-of for the nine months ending March 31, 1887, and for the corresponding months of the year preceding. It will be noticed that there was a small increase in the imports of this line of merchandise, while there was a decrease in exports of considerably over \$1,000,000. Our imports of all kinds of wood and timber manufactured in 1886 were valued at \$5,601,048; the same for 1887 were \$5,354,954. Wood and timber manufactured, including cabinet ware, furniture, etc., for 1886 was valued at \$1,277,061; the same for 1887 was \$984,306. Unmanufactured and free of duty for 1886, \$2,429,118; for 1887 it was \$2,476,005. Making a grand total of imports for 1886 of \$9,321,834; for 1887, \$8,830,010. Our exports of lumber of all kinds during 1886 were valued at \$10,401,032; for 1887 they were \$11,258,511. Our exports of wood manufactures—doors, blinds, house-trimmings, furniture, barrels, etc., amounted to \$3,356,260 in 1886 and \$3,425,284 in 1887, making a grand total of wood and wood manufactures of \$13,761,363 for year ending March 31, 1886, and \$15,191,833 for year ending March 31, 1887. It will be noticed that while there was an increase in the value of imports in this class of merchandise of \$482,824, there was a decrease of \$1,424,820 in the value of exports. Of the imports of wood unmanufactured, \$2,429,118 worth came in free of duty. This came almost wholly from Mexico, Central American States, the West Indies and the countries of South America, and consisted probably of those ornamental and other woods which are not produced in this country. Of the dutiable merchandise of this class, the bulk of it was from Canada, and comes in direct competition with the products of this country. The total value of our foreign trade in this class of merchandise, including imports and exports, for the nine months ended March 31, 1887, was \$23,053,197, against \$24,030,893 for the corresponding months of the year preceding, showing a decrease of nearly \$1,000,000.

**IMPROVEMENT IN LEATHER MANIPULATION.**—A new system of connecting several thicknesses of leather either in making double or triple thickness leather belting, or in affixing the soles of boots to the upper, described in *Engineering*, is being introduced into England, where machines are being exhibited as need for attaching the soles of boots. The new system partakes more of the character of riveting than any other known method, the new rivets being made of metal-covered wax thread. Each fastener is thus a tubular rivet filled with firmly inclosed wax thread. One of the chief objects of this tubular rivet or piece of metal-covered thread is a firm fastening, with greater flexibility than has hitherto been obtained with machine-work. It would be impossible to explain the construction of the machines used without drawings, but we may say that the covering process is performed on a machine in which a strip of brass is pulled through dies which inclose the wax thread fed to it. The tubular thread from this machine passes to another in which the tube is rounded and corrugated circumferentially by small rotating disks with fine teeth. The corrugation helps to give the fastener a firm hold, and also to make it more easily flexible than it would be if the metal tube were plain. The edges of the strip are not soldered or brazed so as to make it into an actual tube. The next machine shown in operation is one in which boot soles are affixed in a few seconds; the machine pierces the leather cut off a length of the metal-covered thread, automatically adjusting it according to the thickness of the leather being fastened. The covered wax thread is then driven vertically into the sole of the boot. It thus presents an end-wearing surface; the brass covering, as the leather wears, burrs over, forming a head on the outside of the sole, and prevents its working into the foot, an objection which attaches to other metallic fastenings.

**THE NUTMEG.**—The nutmeg is grown on islands in the Malay archipelago. The volcanic group of Banda, consisting of three small islands, produce the nutmeg in perfection. This light volcanic soil, the shade and the excessive moisture, where it rains more or less every month in the year, seems to exactly suit the nutmeg tree, which requires no manure and very little attention. All the year round flowers and ripe fruit are to be seen on the trees. Few cultivated plants are more beautiful than nutmeg trees. They are handsome shaped, glossy-leaved, growing to the height of 20 to 30 feet, bearing small yellowish flowers. The fruit is the size and color of a peach, but rather oval. It is of a tough, fleshy consistence, but when ripe splits open and shows the dark-brown nut within, covered with crimson mace, and is then a most beautiful object. This mace covering is valuable and finds a place in the apothecary of every good cook. Within the hard shell of the nut is the seed, which is the nucleus of commerce with which we are all familiar.

**EDIBLE BIRDS' NESTS.**—Naturalists have not been able to decide of what material the edible birds' nests are composed. Some have regarded

them as made of pure animal secretions; others believe that they are largely into their composition. Mr. E. L. Layard has suggested that the nests of the first quality, or those that are made early in the season, are made of secretion, but that later on, if the first nests be destroyed, the birds cannot replace them by this secretion alone, and have to use extraneous substances to help in the construction. Mr. J. R. Green of the Physiological Laboratory, Cambridge, has examined specimens of the nests of various qualities, and has found them all to become alikes gelatinous in texture on soaking, and made up of laminæ affixed by their faces to one another. Some nests of inferior quality showed the presence of algae, but neither in their mode of disposition nor in the quantity did they confirm Mr. Layard's view. The scanty amount and irregular position of the algae would be better accounted for on the theory of their being accidental constituents.

**THE CHAMPION LOG CUTTER.**—The *Oroville Register* says that H. C. Groth, who has been cutting logs in this county for the past 17 years, during which time he has sawed some 34,000,000 feet of logs, performed a feat a few days ago which is unparalleled in the records of log cutting. Inside of 15 minutes he sawed 1581 feet; in 1 hour and 15 minutes, he sawed 6643 feet; in the forenoon of 5 hours and 20 minutes, he sawed 22,000 feet. This day's work of 10 hours and 20 minutes footed up to 39,959 feet, composed of 33 sugar-pine logs 16 feet in length. For proof of correctness of the above figures he mentions for reference A. J. Glidden, J. J. Kitrick and Chas. Dickenson, all of Lumpkin postoffices. This above work was done with the Simonds saw, which Mr. Groth, who has tried all brands, both Eastern and coast make, in his 17 years' experience, upholds above all others and admits of his inability to do the same work with any other saw. He challenges the world to saw against him, and is prepared to back his statement of his ability to saw 40,000 feet of sugar-pine logs in 10 hours' work.

**SOLDERING FLUIDS.**—Some, in fact quite a number, of the soldering fluids used are injurious to tools, and also to parts that have been laid on the bench where such fluids have been used. The following recipe will do the work as well and will not rust or tarnish any more than water would: Take two ounces of alcohol and put into a bottle, and add about a teaspoonful of chlorids of zinc and shake until dissolved. Use it in the same manner as the muriats of zinc or muriatic acid and zinc. It has no bad smell.

## GOOD HEALTH.

## Coffee—Its History and Use.

We give from the *Chronicle* the following report of a lecture recently given by Prof. Lane before the Cooper Medical Institute of this city on the origin, history, and use of the coffee plant:

"In searching for the origin of coffee," said Prof. Lane, "authors have agreed to assign its birthplace to Ethiopia. When it was carried to Arabia it soon became naturalized. In a search for the earliest mention of it, one writer, inspired with that reverence which has sought to find out all things in the sacred book, assures us that coffee is mentioned in the history of King David, where it is stated that this was the potion which was offered by the hands of fair Abigail to calm the excited monarch. The proof urged in favor of this biblical claim is that the drink offered was prepared from something roasted."

"While visiting Paris," continued the lecturer, "I was agreeably surprised to find in a museum a portion of the original coffee shrub which was brought to France. Probably no more precious sample of this berry exists in the world. Coffee, at the time of its introduction into use, was very expensive, selling for from \$20 to \$25 a pound. Such a price led to its general cultivation, and soon, instead of being the monopoly of Arabia, whence it was first derived, it was grown in the East and West Indies, Central and South America, and now large amounts of it are grown in Java, Ceylon, Mexico, Guatemala, Costa Rica and Brazil. The production of the latter country is the largest, being about 4,500,000 quintals annually, one sack generally holding about one quintal. While coffee can only be cultivated in a warm climate, yet it cannot bear great heat. The seed is first planted in a cool, shaded nursery, the infant plants being scrupulously screened from the rays of the sun. It is next transplanted to the fields destined for its growth, and there it is carefully cultivated for nearly five years before the product is sufficiently abundant to be remunerative. The shrub usually reaches a height of from 12 to 15 feet, and is well covered by leaves of a dark, glossy green. Small flowers of snow-white color spring from the stem at the foot of the leaf. When in full bloom the appearance is exceedingly charming. The flowers are soon transformed into round, green berries, which, ripening, present the appearance of red cherries. From two to three crops of mature berries may be gathered annually. The work of preparing the berries for the market is done partly by hand and partly by machinery. Each berry should have two grains on it, yet sometimes but one is found, and this one is especially

prized and commands the highest price. The pulp of the berry is sweet to the taste.

"A chemical analysis of coffee, after being burned, shows that it contains 20 per cent of water and about 50 per cent of cellulose—a substance resembling starch—and grape sugar. The agents which especially distinguish it are caffeine and coffeine. The former belongs to that group of chemical agents named alkaloids. Coffeine is a volatile oil, the result of an essential change in coffee produced by roasting. To this subtle and fugitive principle the aroma of coffee is due, and in roasting this oil permeates the entire grain; but if the heat be too great, or continued too long, it is dissipated and lost. Experiments show that caffeine and coffeine have different effects on the animal body, the caffeine acting as a transient stimulant, while the coffeine is more prolonged in its effects and exercises a sedative or tranquillizing action. But in drinking an ordinary cup of coffee, these two actions are obtained, stimulation preceding for 15 minutes the stage of sedation or repose.

"Coffeine lessens tissue waste. Physicians have found that, among other articles, coffee temporarily arrests and stays this change. Coffee has another action—that of stimulating the faculties. The soldiers of the French army fought better in Syria and Egypt because they received coffee among their rations, and to authors and scientists it has been an untold blessing. Certain evils, too, may arise from its overuse, such as insomnia and palpitation of the heart. Children should not be allowed to drink it freely, because, as Savarin says, it dries them up and converts them into dwarfed machines. Commercial cupidity and dishonesty of the dealers often prevent the article from coming pure on our tables. But there is cheating in all trades. Both ground and unground coffee are falsified.

"Coffee figures largely as a remedial agent and a disinfectant. For nervous headache, it is often a cure, and gives great help in cases of narcotic poisoning or great depression of strength from hemorrhage. As a disinfectant, it is less disagreeable than chlorids of lime and more accessible."

At the conclusion of the lecture, loud applause ensued. Prof. Lane then announced that on the evening of January 20th Dr. Cushing would lecture in the same place on "Physical Exodous."

## The Importance of Vaccination.

Dr. H. S. Orms, president of the State Board of Health, in an article on vaccination says: During the prevalence of an epidemic of smallpox almost every one under the influence of fear or by force of the municipal law is sooner or later subjected to vaccination, and upon many of those previously vaccinated, the operation is repeated. Only the unprotected are attacked, and the epidemic dies out at length for want of fuel. A period of rest ensues, during which a certain proportion of adults who have been vaccinated in youth acquire renewed susceptibility, and others have been gradually but continuously added to the population by birth or immigration who have never had the disease nor been vaccinated. The fertility of the soil is thus renewed, ready for the reception and propagation of the germs whenever accidentally introduced.

We, in California, have passed through one of these periods of rest. Numbers have been added to this population of both city and country, and inasmuch as where there is cause for alarm the duty of vaccination is likely to be postponed, many of these are now unprotected; new material available for the disease has sprung up.

While, therefore, the necessity of vaccination with those who have never been subjected to this safe and simple expedient is, in times of threatened danger, specially urgent, this necessity does not apply solely to them. It is a conceded fact in the history of vaccination that, in very many cases, the immunity it affords is only limited, or for a time. Perfect while it lasts—as perfect, it is believed, as a previous attack of smallpox itself—the duration of the insusceptibility varies with different individuals. Though in some instances it is unquestionably permanent through life, it is safe to say that revaccination should always be tried after the expiration of eight or ten years, or, otherwise, whenever during the prevalence of smallpox it is desirable to be assured of protection. By the observance of this rule, and the general adoption of primary vaccination in youth, it is equally safe to say that one of the most loathsome diseases which afflict mankind may be effectually robbed of its terrors.

**KEROSENE AND DIPHTHERIA.**—A well-known doctor says that the fumes of kerosene when a lamp is turned low are likely to cause diphtheria. The New York Board of Health a few years ago decided that to this, more than any other cause, the prevalence of this disease was to be attributed. This is given as accounting for the fact that diphtheria generally begins to spread with the advent of short days and long nights. Children dislike to go to bed in the dark, and the kind mother lets the lamp remain in the bedroom, usually turning down the flame, so that the light will not keep the child awake. Many bedrooms are thus semi-lighted all night, and the windows being closed or raised but slightly, the atmospheric condition is simply deadly. A turned-down kerosene lamp is a magazine of deadly gas that the healthiest lungs cannot be safely exposed to,



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**ZEILE.**—Amador *Ledger*, Jan. 14: At this time a number of hands were laid off temporarily, in order to clean out the bottom of the shaft and probably sink two or three sets deeper. The cleaning-out process was finished early in the week; the sinking may take several weeks to complete. Twelve or 14 men are employed in sinking, working in three shifts of eight hours each. It is impracticable to hoist rock and sink the shaft at the same time, consequently all miners who have been employed below the 240 level are enjoying a holiday. It is intended to do some repairing at the mill and also shift the engine at the hoisting works to a new foundation.

**CLEVELAND.**—This mine, above Big Bar bridge, on the Amador side of the Mokelumne river, is being rapidly put into condition for active mining operations. There is a pile of ore estimated at over 200 tons on the dump, all of which is confidently expected to reach a high-grade average. By some it has been estimated to yield from \$20 to \$5000 per ton; but wild reports of this nature carry no weight whatever. They are calculated to injure rather than assist the mineral development of this section. Persons acquainted with the gold-bearing quartz of Amador county place no dependence upon such extravagant figures. If the ore reaches anyway near the lowest figures it will do remarkably well. Those who have seen the pile say the rock has all the indications of proving of a paying character. It is heavily charged with galena sulphurets. They are putting up water-power machinery, and have laid over 300 feet of pipe, with a pressure of 300 feet. We expect to hear of good results from this mine. It is owned by Col. Robinson, but has been bonded by a Mr. Taylor, who is urging forward the development work.

**VALPARAISO.**—At this mine M. Garabaldi and his two partners got through with their contract in running the tunnel last week. They have been three years on this work, and have bored through the ground for 1300 feet in that length of time, carrying the breast of the tunnel to within 200 feet of the south boundary line dividing the claim from the Mammoth. In payment for this big undertaking they receive a quarter interest in the mine, or a one-twelfth interest each. In running this tunnel they have come across several deposits of the rich black metal peculiar to that district. It is believed a regular ledge exists about 30 feet through the slate on the hanging-wall side, and it is intended to crosscut to ascertain whether this idea is correct. The erection of a mill is talked of, but what kind of a mill is best adapted for the ores of this district is a question not easily answered.

**AMADOR GOLD MINE.**—There is an activity about this mine which presages well for the faith of its promoters in its value and permanence as a future gold-producer. A large three-compartment shaft has been started southeast of the present works. In the other two shafts the developments are of a highly satisfactory nature. In one a large ore body 30 feet wide has been encountered. In the other a six-foot vein has been cut. Practical miners say the rock looks well, and ought to reach, judging from its appearance, considerably above the paying standard. Over 30 men are employed about the mine, and the number of hands has been increasing steadily for some time. All indications continue to point to the developing of a big mine. The erection of a mill and the decisive settlement of the question whether the ore will yield satisfactory results by actual mill process is a matter of vital importance to Jackson and the mines in the immediate vicinity of the Amador. The actual extraction of gold in paying quantities from the vast fissure vein exposed in this mine, will do more for Jackson than any event that has happened since the resumption of work at the Zeile.

**SUTTER CREEK.**—Cor. Amador *Ledger*, Jan. 13: Everything in this section has been tied up by frost. The mines and mills are all idle, pipes and faucets in many cases being bursted. The Hector Co., better known as the Mahoney, is likely to be the scene of another legal conflict. Mr. Stewart, who has leased a portion of the Lincoln mine to four miners, has been denied the right of way to the mill by the Valentines, the ground below the Lincoln mine and mill belonging to them. Mr. Stewart claims, that having had the right of way for the last 15 years, he cannot now be deprived of it, so long as he does not damage the property of others.

## Calaveras.

**MURPHYS.**—Cor. Angels *Record*, Jan. 11: Mining is still the all-absorbing topic in conversational circles, and we look forward to the not distant day when we will be enrolled in the bullion-producing districts not far from the front. The recent cold weather has retarded work considerably, but fairer weather will start the mills again. Six hundred pounds of powder was exploded on the 2d inst., in the bank of the Central Hill gravel mine owned by McCormick, Bisbee and Thomas. L. Hausler superintended the firing of the blast and it was an entire success. A dull sound was heard, an undulating movement of the surface observed, and two acres of gravel, nearly 30 feet deep, was broken ready to yield to the action of the hydraulic as soon as the thaw commences. Then the gravel will be piped off level with the present flume, and the bottom will be hoisted with a derrick. Although the entire bank contains gold in paying quantities, it is on the bottom that the better pay is found. All mining enterprises are on a standstill; mills and mines inert on account of the cold snap. The Ora Plata labored hard to keep the pump in motion, but had to succumb to the extreme cold weather that has done up everything. The same may be said of the Esmeralda and all other mines where water is the motive-power. There is a scarcity of water for gravel diggings also and will be, until a thaw sets in. The supply in the Union Water Co.'s ditch, of course, is greatly lessened by the water freezing in the river and forming anchor ice in the flume.

**STORE OF SNOW.**—Angels *Echo*, Jan. 14: The mine-owners of this section have just cause to feel jubilant over the immense store of snow now laid up

in the mountains, which, it is reported, is sufficient to supply the water demand for mining and milling purposes throughout the entire year.

**MOHAWK.**—Things are being put in readiness at the Mohawk gold mine, formerly known as the Comet mine, situated about 1½ miles from San Andreas, on the Mokelumne hill road. As soon as everything is in readiness, work will be commenced on an extensive scale.

**ORE.**—It is currently reported that Mr. Chas. J. Nickerson will proceed at once to place men at work extracting ore from the Tiberghien mine, situated a short distance west of this town. The ore, we are informed, will be crushed in the Gold Cliff mill, and if the test proves satisfactory, Mr. Nickerson will purchase the property and make preparations to develop the mine on an extensive scale.

**INTERRUPTED.**—Mining operations are greatly interrupted here by the present cold snap. Nearly every water conduit in this section is frozen up, and in consequence the mills heretofore have been compelled to close down until the ice and snow thaw. Quite a number of the miners are laid off at the Nevills and Utica mines until water can be had.

## Inyo.

**KEYNOT.**—Inyo *Independent*, Jan. 14: Mike Lasky has eight men at work in the Keynot mine; they are getting out ore and the mine is said to be looking very well. Mr. William Charles is vigorously pushing work on mines recently bonded by him north of Bishop Station. The prospects are very encouraging.

## Los Angeles.

**SAN GABRIEL SILVER.**—Los Angeles *Times*, Jan. 14: Over 25 years ago, as many remember, rich silver mines were located and worked in the vicinity of San Gabriel canyon, in the mountains of the same name. From the many shafts and tunnels now to be found in different sections of that locality, it can be seen that prospecting was extensively carried on during those days. It has always been considered that a rich lode was to be found somewhere in the vicinity of the old Zapata mine, as everything indicated that large bodies of ore had at one time been extracted from the heart of the mountain at that point. Until last September miners have received little or no encouragement for their researches. During that month Mr. Henry Defty, a practical mining engineer, discovered croppings which led him to believe that a rich body of silver ore lay at no great depth, and be at once formed a syndicate of English capitalists for the purpose of developing the lode. The location of the ledge is on the north side of the San Gabriel river, about 2½ miles up the canyon from the town of Azusa. The location is farther up the canyon than were the old Zapata claims, and surrounds the whole of the mountain in which the latter was formerly worked. There are 15 claims in all. A drift was first run into the base, or bottom rock, so as to retain uniformity and avoid expense in timber, and to preserve the shafts, etc., in the future. This drift is driven in about 250 yards, and has cut one seven foot, and another 30 foot lode, each of which is overlaid by a large vein of silver-bearing ore. An assay of the rock at this point shows from 20 to 200 ounces of silver, with from five to seven ounces in gold. It being reported that a rich find had been made of late at the Victoria mine, a *Times* representative was recently detailed to make a report of the condition of the workings of the English mine. Between 300 and 400 tons of ore were found on the dump at the time of the reporter's visit. An air shaft was found sunk so as to cut the top lodes, and is so constructed as to meet a tunnel run from the level of the river and which meets the lower ledges. The air shaft is timbered on top only, and is at present but 40 feet in depth. The lode in which the late rich strike was made is known as the Daisy, and the last assay shows from \$65 to \$191 to the ton of rich-bearing sulphate of silver. Seven assays have already been made, and all are of the most encouraging character. From 20 to 40 men are employed. Ground is being leveled for the erection of a quartz-mill, plans and specifications being already completed by Mr. William Defty, a civil engineer of London. There will be several sets of stamps, comprising 20 stamps to a set, and it is anticipated that the first set will be in position within two months' time. Two tunnels are now in working order. It is not accurately known what the width of the main ledge is, nor can this fact be ascertained until the crosscut is made.

## Nevada.

**SUSPENDED WORK.**—North San Juan *Times*, Jan. 13: The Grant mine, in consequence of the cold snap, which froze up the water supply, was compelled to suspend milling operations for a few days; therefore no general cleanup and no dividend. The Delhi has suspended crushing for an indefinite period, because of the closing of the ditch, by snow, from which the mine obtains its water-power. In the meantime quarrying rock still goes on.

**ENCOURAGING DEVELOPMENTS.**—*Transcript*, Jan. 13: Alf. Tregidgo, manager of the Washington and Bluebell mines in Washington township, came down yesterday and to-day goes to San Francisco for a week's stay. The mills at both of the mines, which had been temporarily shut down on account of the cold weather, were started again yesterday and are now crushing steadily. At the Washington the work of exploitation has resulted in opening one of the largest and best ore deposits ever seen in that part of the county. The mammoth ledge at the Bluebell also continues to hold its own. The capacity of both mines will be increased next summer by the addition of more stamps.

**NOTES.**—*Transcript*, Jan. 17: Chas. Pinch, Ed Smith and Tom Coughlan have been awarded the contract of the Wyoming mine. John Bonney has taken out 20 tons of quartz from his mining claim in his dwelling lot on Piety hill. Jerome Cook, W. J. Organ and others have been prospecting a gravel claim near Gussett's ranch. They have struck gravel that yields quite well.

## Placer.

**GRAY EAGLE.**—*Argus*, Jan. 14: The Gray Eagle Mining Co., near Spring Garden, received a new engine and boiler from Joshua Hendy. The mine is running full-handed and is doing well.

## Plumas.

**MINERAL TOWNSHIP.**—Cor. Plumas *National*, Jan. 14: Right glad are we to chronicle that the revival of gold quartz-mining in the county and

State generally is on a boom. New mines have been discovered, and old ones are being opened up and worked with advantage to the owners, and such being the case, the miner's outlook in these mountains gives us all to feel there is a better day dawning in the future for the much-abused miner. There is a true mineral belt of a rich gold-bearing quartz running through this county, and a few mines only have been opened on it, but prospecting on said belt has been quite brisk the last year, and as quartz-mining in California on the whole is yet in its infancy, we must wait developments. We have millions of tons of quartz in this county that will pay big interest on investments if worked with economy on the improved basis of milling.

## Shaeta.

**BULLION.**—Shasta *Democrat*, Jan. 11: Fifteen bars of bullion from Iron mountain were shipped from Redding last Friday to the Argo smelting works, Colorado. The bullion weighed 2000 pounds.

**SHUT DOWN.**—The Squaw creek mines and mills have been shut down during the late cold snap, as the water used in milling kept freezing, thus interfering with operations until the operators had to quit.

**BULLYCHOOP.**—F. D. Robinson of Ono says Bullychoop mining district is developing wonderfully, and believes it to be one of the best mining districts in the State. An English syndicate recently offered Senator Foster \$350,000 for his group of mines in which Mr. Robinson was formerly interested, but Mr. Foster declined the offer, holding the property at half a million dollars.

## Sierra.

**THE ALASKA.**—North San Juan *Times*, Jan. 13: Colonel Bates, who has been absent for several weeks in the interest of the Alaska mining company, arrived here Monday, en route to Pike City. The probabilities of a speedy consummation of the sale of the Alaska are very flattering. This contemplated sale has been pending for a long time and would have been consummated ere this but for unforeseen circumstances which could not be avoided, the resignation of the Assistant Secretary of the Interior being one of them. We learn from the colonel that, independent of the sale of the mine, he has made arrangements with Eastern capitalists for the means of liquidating any debts the company owe and to place it on a paying basis, so that hereafter full payment of employees shall be made every month in full; also for the erection of additional stamps, so as to increase the number to 60, and to sink 250 feet below the 500-foot level; also for the placing in position of duplicate pumps of larger capacity than those now in use.

## Siekiyou.

**SCOTT BAR.**—Yreka *Union*, Jan. 14: Mr. Shepherd had to close down his mill on account of the cold snap, and all the other mills can do little or nothing. The Scott River Ditch and Mining Co. are at present setting up their new Monitor on Whiting bill.

## Trinity.

**ANOTHER GOOD CLEANUP.**—Trinity *Journal*, Jan. 14: Mr. A. T. Jackson, superintendent of the Enterprise mine, East Fork district, came in town last Sunday with \$1600, as the result of crushing 13 tons of ore from that mine—an average of about \$125 to the ton; the dump is full of the same kind of rock, but means of crushing it are deficient. The cold weather and snow have stopped the arastra, but work on the mine is continuing just the same as ever. Three tunnels are now being run; in the upper tunnel the ledge is two feet wide and of very high grade. The company are also running a tunnel on the Lone Jack; they are in about 80 feet and think they are in the vicinity of the ledge. Mr. Jackson says that four years' work with an arastra is in sight now in the Enterprise. The chance of finding an equally good ledge in the Lone Jack is promising. The company have a fine property and are talking of putting up a mill on it in the spring.

## Tulare.

**MILL CREEK MINING DISTRICT.**—Kingsburg  *Herald*, Jan. 14: Situated some 24 miles east from Kingsburg, well up in the foothills of the Sierra Nevada, there are gold mines being worked which at this present time give every indication that ere long their output in gold will place the properties in a very profitable position. The principal mines of the district are the "99" and the White Cross. The tunnel of the former is in some 90 feet, with the face showing up finely. The ledge at this point is some 19 inches wide and the rock is free milling ore. The mill returns an average of \$22 per ton, which gives a good margin for profit. The owners of the White Cross have started to run a tunnel, and expect to tap the ledge when in 100 feet. The industry of that section is not alone confined to gold mining. There is a large quarry of limestone, which is to be extensively worked in the spring. The Diamond Limestone Company have started the building of three kilns for the burning of the stone. They have about 20 men at work. Mr. Donahoo of Fresno has contracted, it is said, for all the lime the company burns this season when in operation. Mr. P. W. Rider, who kindly furnished us the above items, adds that all indications point to Dunlap, which is the postoffice address of the camp, becoming a very active place in the spring.

## Yuba.

**QUARTZ LOCATION.**—North San Juan *Times*, Jan. 13: John Downey has located a quartz claim at the junction of the Middle and North Yuba rivers, on the Yuba county side, which is 30 feet in width 30 feet below the surface. Almost every piece taken from the ledge shows free gold. It is the continuation of the lode located by George N. Powell, Frank N. Morris and Fred Philbrick on the Nevada side of said rivers.

## NEVADA.

## Wahoe District.

**CON. CAL. AND VIRGINIA.**—Virginia *Enterprise*, Jan. 14: Are still stoping out ore south and west from the bottom of the winze down from west crosscut No. 2. This ore is still of a high grade. On the 1300, 1500, 1600 and 1650 levels the various drifts, winzes and upraises are being pushed ahead in promising material. The usual amount of ore has been shipped during the week, the average assays of battery samples being about the same as last week.

**SAVAGE.**—On the 400 level the north drift has been advanced 50 feet. Are saving some ore from

this drift. The south drift has been advanced 62 feet, and has its face in low-grade quartz. On the 600 level the main south drift has been advanced and timbered 20 feet. The face shows stringers of ore. Ore is being extracted from the several levels between the 400 and 900 levels. The severe weather has frozen the water in the Carson river and temporarily interfered with ore shipments.

**GOULD AND CURRY.**—On the 250 level east crosscut No. 2 has been extended 23 feet; total, 61 feet. The face is in bird's-eye porphyry. Are running prospect drifts in the old stopes in different directions and are finding some ore of milling value. On the 1300 level the south drift from the east crosscut has been extended 50 feet; total, 103 feet. The formation in the face is hard porphyry. Are making some necessary repairs to the main shaft below the 1000 level.

**HALE AND NORCROSS.**—On the 400 level, 50 feet back from the face of the west drift, have started a drift north and south. The north drift has been advanced 20 feet and the south drift 30 feet. On the 700 level the ore development shows further improvement. From the top of the north upraise have begun to crosscut east and west. The east crosscut is out 8 feet, and continues in good ore. The west crosscut has been advanced 12 feet, and is in excellent ore.

**OCCIDENTAL.**—No. 1 upraise, south of the north incline winze, upper tunnel, has been carried up 16 feet; total raise, 39 feet. No. 2 upraise, 72 feet north of the north incline raise, has been carried up 20 feet; total raise, 49 feet. Are overhauling the track in this tunnel. The ore extracted on the 48, 100 and 200 levels has been held in the mine. From the points named 50 tons of good milling ore has been broken down and is in the chutes.

**BELCHER.**—Streaks of low-grade quartz are still showing in the face of west crosscut No. 2, on the 400 level. Good headway is making in the south drift on this level. On the 500 level good progress is making in the south drift from the south drift in the Crown Point. From this drift an upraise will be made in the Belcher ground. Are still pushing forward the Suto tunnel drift.

**BALTIMORE.**—The pumps are fast reducing the water in the main shaft, as the inflow from the face of the crosscut on the 300 level is gradually decreasing. There are deposits of good ore at two or three points between the 300 and the 500 levels that can be worked as soon as the water has been reduced.

**CHOLLAR.**—Good headway is making in the re-opening of the main incline from the bottom of the vertical shaft down to the Suto tunnel level. The usual amount of development work is being done and much good milling ore has been opened up, ready for extraction.

**SIERRA NEVADA.**—The usual progress has been made in the southwest drift from the main north drift. It is passing through a vein material composed of quartz, clay and porphyry. This drift has been turned and is now running almost south.

**EXCHEQUER.**—The west crosscut on the 122 level is making good progress in favorable material, and No. 2 east crosscut on the same level is out 90 feet. Good progress is making in the northeast crosscut on the 222 level; also in sinking the shaft.

**UTAH.**—On the 472 level the east crosscut from the north drift from the end of west crosscut No. 6 has been extended 32 feet; total length, 50 feet. This crosscut is passing through a porphyry, clay and quartz formation.

**ALTA.**—Ore is being extracted at the usual points. Owing to the severe weather and the depth of the snow in the vicinity of the works, little can at present be done at ore crushing.

**BEST AND BELCHER.**—On the 1300 level west crosscut No. 2, opposite east crosscut No. 1, has been extended 12 feet; total length, 57 feet. This crosscut is in vein matter giving low assays.

**YELLOW JACKET.**—The daily shipments average 300 tons of ore. This ore comes from points between the 1100 and 1400 levels. On the 1100 good ore was cut near the Confidence line.

**CROWN POINT.**—The indications are that the west crosscut on the 500 level will soon cut the ore vein found 100 feet above. A considerable flow of water has been encountered.

**HAYWOOD.**—The ore development on the 200 level continues to look well. The extent of the deposit is not known, but the indications are that it is of a large size.

**SCORPION.**—On the 300 level the south drift has been advanced 43 feet and the north drift 54 feet. Work was interrupted for a few days by the recent storms.

**POTOSI.**—The stopes on the 250 and 350 levels are yielding the usual quantity and quality of ore. The assays of battery samples at the new mill average \$20 a ton.

**BENTON.**—Work is progressing favorably on the 725 and 800 levels. The material is vein porphyry, with some clay and stringers of quartz.

**OPHIR.**—The north drift from the workings in the winze 35 feet above the 1435 level is still following a promising streak of ore.

**OEST.**—The ore-producing sections are all looking well and development work is being done in very promising ground.

**SEGREGATED BELCHER.**—On the 1300 level the south drift from the upraise is in quartz giving low assays.

**ANOS.**—On the 350 level streaks and bunches are being encountered in the west drift.

**WEST CON. VA. AND CAL.**—The work of sinking the main shaft is progressing favorably.

**MEXICAN.**—The west crosscut from the north drift is in soft vein porphyry.

## Columbus District.

**LUCKY HILL.**—Esmeralda *News*, Jan. 14: It is rumored that the Lucky Hill series of mines will start up shortly and a force of 30 men will be employed at once, which will be increased as rapidly as possible.

## Dun Glen District.

**THE LANG SYNE MINE.**—Silver *State*, Jan. 13: The Lang Syne mine and mill at Dun Glen has been purchased by J. V. McCurdy, superintendent of the Paradise valley mine, who will run it on his own account. He intends to increase the crushing capac-



ity of the mill from 15 tons to 45 tons per day by adding Huntington crushers and concentrators to the battery now in use. He also intends some time next spring to erect works that will reduce 75 tons of ore daily. He will commence operations next week and is now having teams shod and wagons repaired to haul ore and sagebrush to the mill. Grading will also be commenced for the new mill, the machinery for which will be ordered immediately. T. D. Soper, who has been foreman of the Paradise valley mine, will assume charge of the mine and mill. This will give Dun Glen quite a boom, and as there is plenty of ore in sight in the mine, and as the lead is a true fissure vein and opened by tunnels to a depth of 500 feet, the old camp will doubtless have many years of prosperity.

#### Eureka District.

**EUREKA CON. MINE.**—Eureka Sentinel, Jan. 14: For several weeks past we have heard it reported on the street that a great improvement was taking place in the Eureka Con. mine, and we have had an opportunity to see what ore was being delivered at the furnaces in town. We mentioned in the Sentinel several weeks ago that the ore was increasing in the mine, and further, that there were several train-loads delivered at the smelters. Since Al. Burt was appointed foreman it has leaked out that he has been kept busy poking around through all the old holes in the mine wherever there was room to crawl through. A number of old drifts and openings have been cleaned out, and several places that presented a showing, or a good prospect, have been attended with good results and ore found. It was currently reported on the street last Monday that a big strike had been made on the 200 level of the K K, where it is well known that there is plenty of room for large chambers of ore to make. A miner, who has been known on Ruby Hill and in other mines as a very lucky tributer, has had a pitch on the 200 level of the K K for the past four or five months, where he has made only a bare living. It is now stated that he has followed indications that have led him to a deposit of ore of no small dimensions, and that it looks as if it would open up into a big chamber. Last Wednesday we heard that this ore had been penetrated for a distance of 30 feet. We learn from a reliable source that there is a large quantity of ore broken in the mine that will work from \$25 to \$100 per ton; and further, that a train-load of ore per day, for several weeks to come, can be broken down and sent to the furnaces as soon as they are ready to receive it; also, that the tributer's pitch, above referred to, is yielding ore that will work as high as \$100 per ton. Besides the tributers there are from 20 to 25 men at work in the mine on day's pay, and some of the later are breaking down ore in good paying quantities. The mine is, in fact, looking better in every direction than it has before for the past three years. It is at present self-sustaining, and notwithstanding that considerable dead-work is being done, we confidently expect that in a few months from now it will be on a dividend-paying basis, independent of the slag dump at the furnaces, from which the late dividends have been paid. Foreman Burt, under Superintendent Donnelly, is pushing prospecting ahead wherever there is a chance for ore to make; and we have every reason to hope that the Eureka Con. mine will again loom up as in former years.

#### Hawthorne District.

**THE MINES.**—Esmeralda News, Jan. 14: Last Thursday D. Tubino, one of the lucky owners of the Gold Bar mine, showed a reporter of the News a piece of rock from that mine which weighed about ten ounces, it being one of a number of specimens that he had extracted for samples, and if Mr. Tubino could get but one ton of the same kind of rock we will venture the assertion that his share of the net profits would be \$1000. Several men are now at work on the property and in a few days it is expected that the main body of ore which is known to exist in the mine will be reached. Some very rich rock is also being produced by the Half Moon Bay mine, in the same district. As this property has had but comparatively little work done on it so far, it is to be hoped, for the benefit of the district, that the favorable prospects will continue. Messrs. Wood & Olsen, the lessees of the famous Lapanta, have a large force of men at work. The lease runs several months, and the indications are very favorable. In the Pamlico much deadwork is being done at the present time, the same being necessary in order to open up the property so that when the extraction of ore is again resumed it will not have to be handled more than once. S. V. Hauger has located the G. C. Scott, which is said to have very valuable prospects.

#### Marietta District.

**GOOD PROPERTIES.**—Esmeralda News, Jan. 14: There are about 25 men at work in Marietta district, this county, and from the following items, obtained from a gentleman recently from that district, it will be seen that the mines are all good paying properties. The recent storms have interfered considerably with the work of the miners and in consequence a number of the mines have been closed for a short time. Bradley & McClellan, owners of the Big Elephant, are doing considerable work. About two weeks ago they had a quantity of ore worked at the Candelaria mill and the result was very satisfactory. They now have about four tons of ore on the dump which will average \$130 per ton in silver and \$9 in gold. M. M. Comstock has an eastern extension of the Big Elephant and his prospects are excellent. He has a shaft down 80 feet with a ten-inch ledge therein which carries ore that will go \$110 in silver and about \$13 in gold. Mackey & Landey are working on the Rip Van Winkle. Their ore assays from \$60 to \$100 per ton in silver and 47 per cent lead. They expect big things from the sleeper, and if present indications are to be considered, their hopes will certainly be realized. Frank Maguire is working hard on his mine. His ledge is well developed and carries ore worth \$50 per ton in silver and 60 per cent lead. Frank has a good mine and is highly elated over his prospects. Four men are now employed on the Endowment mine, owned by Smith & Co. Eleven tons of ore are now at Candelaria to be worked, and the result is anxiously looked for.

#### Rebel Creek District.

**QUIN RIVER.**—Silver State, Jan. 11: T. F. Melody is down from the Quin river country. He says there are several prospectors at work in Rebel creek district. Frank Snapp has men at work on the

Rome ledge, which he thinks will prove to be another Ohio. The Ohio Company are working steadily on their mine and have developed very rich ore bodies. The Bartholdi, owned by Shone & Co., is looking well and producing considerable rich ore, principally gold.

#### Reese River District.

**MANHATTAN MINE REDEEMED.**—Reese River Review, Jan. 14: John L. Beveridge of Chicago, representing the Chicago creditors of the Manhattan Company, has by redemption of the real property and purchase of the personal property, succeeded to the rights which the Lander Company acquired at execution sale. The papers investing him with their rights were finally delivered yesterday, and the purchase money paid to the treasurer of the Lander Company, and to-day C. P. Soule has been disbursing it to the li-holders according to their respective rights. The amount paid for the redemption of the real property was \$38,940, and for the personal property, including the expenses attending its preservation, etc., since the sale, \$14,865, making the total sum paid \$53,805. In addition to this amount, Gov. Beveridge has arranged for the payment of some of the judgments against the Manhattan Co., and hopes at an early day to arrange for all. We understand he will pay the State and county taxes, amounting to over \$5000, and complete the contracts for the Free concentrators now in use, but as yet not fully paid for. By this transaction the Chicago people, who are men of wealth, business energy and character, have succeeded to the rights of the purchasers as to the mines and other real property of the Manhattan Company, and to the absolute title of all the personalty. They have already taken possession of the personal property and are providing for its safe-keeping as well as the preservation of the mines. We have reason to believe that the work of mining and reducing ores will be resumed at an early day and as soon as arrangements can be made to that end.

#### Spanish Belt District.

**BARCELONA.**—Silver State, Jan. 14: The work of development is pushed ahead energetically in the Barcelona mine and good ore is still encountered. The indications point to the uncovering of big bodies of ore in the near future.

#### Ward District.

**CONTRACT.**—Silver State, Jan. 14: John Martin, of Ward, has secured the contract from the Martin White Co., to sink a 100-foot shaft on the Young America ground. He has started in on the work.

#### ARIZONA.

**MOHAVE COPPER MINES.**—Cor. Mohave Miner, Jan. 14: The recent raise in the price of copper has created quite an active interest in copper properties, and your correspondent, learning of the activity in this direction, has hunted up some information. There is evidently a decided local move in copper and some sales are rumored, but nothing definite as yet can be learned. Messrs. Merrill & Lewis returned Friday of last week from doing the assessment work on two big copper mines and from them some little information is gained in regard to some of Mohave's copper properties. These mines are some 40 miles south of Kingman, on the west side of the Wallapai range, and about 12 miles east of Yucca, on the A. & P. railroad. There are a number of locations in the district, but on only two of which has work been done. One of these mines is the Antler, owned by Messrs. Mackenzie & Rosborough, and is located in a little range of foothills, with almost a natural wagon-road direct to the mine. The ledge is fully 100 feet wide, and in every instance where any work has been done a fine grade of copper ore has been struck. The greater part of the work has been on the north side of a shallow ravine, the ore having simply been quarried out. In the center of this big excavation a shaft has been sunk 50 feet, and a 14-foot crosscut run, showing that number of feet of solid ore, without having struck either wall. Lower down the wash is another shaft, while on the opposite several drifts and cuts have been run, all showing ore. Some four miles further up into the main range, but on the same mineral belt, is the Copper World, owned by Messrs. Beecher & Co. This mine was worked some three or four years ago quite extensively, and shows, as the name would imply, a world of copper. Two drifts, one 65 feet and the other 250 feet, have been run into the mountain, cutting the vein at right angles. In the lower or longer tunnel a raise was started for air, while in the upper one drifts have been run each way along the ledge. Some very pretty specimens of ore were brought up from this mine, some of them showing native copper and copper sulphurets.

**LARGE LEDGE.**—Prescott Courier, Jan. 10: Theo. Boggs Hackberry is looming up, or rather down, grandly. The ledge is large and very rich in the new shaft, the depth of which is about 35 feet. Harland of the Howard led his animals out of the snow and has gone back to dig out more nuggets. John O'Connell, who is running a tunnel for Mr. Leavick, is in town, and says there is much snow in Hassayampa district. R. Cartmell is wanted badly on Big Bug to erect mining machinery. Geo. Merwin thinks of starting to-day to work Dorisore.

**MARTINEZ DISTRICT.**—Prescott Courier, Jan. 12: F. M. Murphy arrived Sunday last from the Congress mine, Martinez district, from which property he recently shipped several tons of ore, through the Prescott sampler, which yielded 23 ounces of gold to the ton. This is, of course, a big yield, but the mine itself is big in every way.

**WALNUT GROVE.**—A. E. Foote, just from Walnut Grove and the Castle creek country, tells of large and rich ledges seen by him in both districts. He found the Mayflower looking well. Placer miners were shoveling, rich gravel into their sluices. He was accompanied from Skull valley by Messrs. Barrett and Murphy.

**HASSAYAMPA.**—John McDonald walked to town yesterday from the Blue Dick mine, Hassayampa district. Himself and partner are taking plenty of rich silver out of the Dick. He came through deep snow, but arrived "as fresh as a daisy." The men who have leased the Lynx creek hydraulic diggings have not as yet started washing, but will do so shortly. They ought to take out a mule load of gold between now and dry weather. Sluice and rocker miners are catching considerable gold in Hassayampa, Lynx, Big Bug, Turkey Black canyon and

the other auriferous creeks. Now, while snow covers the hills and stops the transportation of ores, is a good time for mine-owners to work in tunnels, shafts and drifts; develop their properties and be prepared to let mine-hunters who will soon be here by the score see that we have in this section what they want.

#### COLORADO.

**TUNNEL.**—Elk Mountain Pilot, Jan. 12: The Pennsylvania tunnel is being developed in a satisfactory manner this winter. Mr. A. B. Williamson has Charley Devine working with him, who is a first-class drill-polisher. The tunnel is running on the vein and is in about two feet of good galena ore. Next to this ore body is a quartz streak, also containing some lead and gray copper. Doc Evans made a new location in Poverty gulch the first of the year and called it the Chicago lode. The Bonanza King lode, situated up Slate river, is being worked this winter under a lease by Doc Smith. The winter force has been increased on the Daisy mine, so as to push the development for a large output of mineral in the spring. This property is in Redwell basin, and is one of the coming heavy ore-producers of this country.

#### DAKOTA.

**MICA MINING.**—Custer Chronicle, Jan. 10: Recent inquiries with a view of securing the entire control of the production of mica in the United States, as indicated by a New York special telegram, appearing in our issue of last week, will doubtless have a very decided tendency toward bringing the mica mines in this vicinity into good request. Already evidence of a desire upon the part of mica men from abroad to secure interests here has been manifested by the arrival of two prominent gentlemen from Minneapolis, with the special object of securing a valuable mica property near this city. We are glad to state that the object of their mission was realized, and that operations will be resumed by the gentlemen referred to upon what is known as the White Spar mine at the earliest practicable day. Under the impetus which is liable to result from the mica pool now being organized in the East, it would not be surprising if all of the prominent mica mines in this vicinity would resume operations at no distant day.

**SHIPPING ORE.**—Black Hills Pioneer, Jan. 11: Horseshoe Comet Tuesday forwarded to Sturgis the first installment of a carload of ore the company is about shipping to Omaha. Superintendent Dorne was in the city last night, reporting that he has 10 men employed at present, most of them doing dead-work. Progress in the mine's development has lately been slow, owing to the fact that rock of a particularly hard character has recently interfered with rapid headway. It is probable the force employed at present will be augmented by several additional men next week. Tuesday's Rapid City papers state that on Monday, Harry Gregg brought to that city another report from the Castle Chief. The results of the work at the mine are very satisfactory, and Mr. Gregg and all others interested are to be congratulated. Frank Peck returned from Spruce gulch yesterday, where he has been engaged doing assessment work on the Dom Pedro and Skidmore lodes. In the tunnel on the latter claim, good ore, averaging \$60 per ton in gold and silver, has been found. The claims belong to Herman Bischoff of this city.

#### IDAHO.

**CEUR D'ALENE ORE SHIPMENTS.**—Butte Inter-Mountain, Jan. 14: A letter just received from Patrick Clark, general manager of the Poorman mine, by Chas. S. Warren, secretary, gives some interesting information concerning that great property and also concerning the ore shipments from other leading mines. He says: "The mine is looking about as usual. We have shipped 73 tons to date and will keep on as fast as the railroad will haul it. They are having some trouble with ice on the lake—not, however, with the new boat; but it is not able to keep the ore cleared away from the Mission. They are now going to run the old boat in the wake of the ice boat, and if successful the two will be able to get away with it all for this winter. There is more ore leaving this country than I expected to see this winter. The Sullivan is shipping daily 36 tons, Tyler & Stewardman 25, Sierra Nevada 10, Granite 15, Tiger 30, Poorman 25 tons. In our case we can only count on that amount for a short while, but with a 50-ton concentrator, we can keep it up without any trouble. The face of No. 2 tunnel has three feet of first-class ore to-day."

**THE IDAHOAN.**—Salt Lake Tribune, Jan. 14: J. S. Childs, superintendent of the Idahoan mine, is down from Wood River. He reports that the mine is being put in shape for pushing development. Bullion has been cut off from the outside world for two or three days because of deep snow and some slides, which blocked the road up the canyon. Mr. Childs speaks hopefully of making the Idahoan a good producer next summer.

**THE MINNIE MOORE CLOSED DOWN.**—It appears to be the general impression among mining men from Idaho that the closing down of the Minnie Moore bad, for one of its chief objects, the reduction of wages to miners. That and all other companies have been paying miners \$3.50 per day, and now that the mine has been closed four weeks, it is reported that men will be put on at \$3 per day, and if enough offer at that price, the property will start up again.

**QUARTZBURG.**—Idaho Statesman, Jan. 7: David Coughanour of Quartzburg arrived in this city on Thursday. He says that there is considerable snow in that section which has the tendency of bringing smiles to the faces of the placer miners, as their chief reliance is water. New developments have been made in quartz—some high-grade ore has been found in the Pioneer which will tend to make more work and business lively.

#### MONTANA.

**WEST GRANITE.**—Inter-Mountain, Jan. 16: The West Granite has been from 1 foot to 18 inches of pay ore. The Hecla Co., at Glendale, is erecting a large roaster to dispose of the large accumulation of flue dust. The Granite Mountain's output for the

last week in the year was 53,570.17 ounces of fine silver and 30.48 ounces of gold. The decrease was owing to giving the men a holiday. In the Bamboo Chief, Jefferson county, the other day, a four-foot vein of fine smelting ore was struck at a depth of 50 feet, and the managers felt so encouraged at the prospect that they immediately let a contract to have the shaft sunk 70 feet further, and will proceed to erect steam hoisting works.

#### NEW MEXICO.

**SILVER DELL.**—Silver City Enterprise, Jan. 14: The strike in the Silver Dell at Georgetown is said to be a big thing. If it is all that is claimed it will help the camp wonderfully. Eight silver bricks, valued at about \$10,000, were this week shipped from Georgetown by the Commercial Mining Co. Seven bricks were shipped from that camp last week. This is as good a showing as any camp in the country can make. It is a matter of doubt whether the Bremen mill can be kept running much longer, as the miners will not bring in their ore. It has been kept busy the last week on ore from Cow Springs, but there is difficulty in getting teams enough to haul the ore. There is plenty of ore in the country, but for some reason the miners will not haul it in. The sale of the old Pacific mine at Pinos Altos to St. Louis parties was not unexpected, as many different parties have been anxious to purchase the property for months past. The price paid for the mine is \$40,000, \$5000 of which is in cash. The Pacific was worked quite extensively in years past and was always one of the best producers at Pinos Altos. Work was suspended when the rebellious ore was reached. Since that time the title has been vested in a number of minor heirs; consequently nothing could be done with it until recently. The ore body is from 10 to 18 feet in width, and is considered high grade for gold ore. C. H. Wilkie, who has the contract for the erection of the Key mill at Pinos Altos, was in Silver this week, and reports that he now has about 25 men at work on the foundations and is preparing timbers for the new mill.

#### OREGON.

**CHLORIDE MINING CO.**—Bedrock Democrat, Jan. 11: This property is improving with depth and shows a fine body of ore having an average width of about four feet. The ore is free milling and most of the samples were taken to get an average value of the ore and not to show big assays. Average for 19 samples, \$127.96 per ton. Assays by Fox & Bacon, assayers, Baker City, Oregon. The returns from ledge sample shipped to the Portland reduction works from No. 1 are \$74.36, and No. 1, second grade, \$45.16 per ton. Mr. T. R. Bentley, the superintendent, reports that in No. 7 crosscut the ledge is ten feet wide. Some fine specimens of ruby silver have lately been found. F. K. Remington of La Grande is at the mine building track and getting out mining timber. Work on the tunnel is being pushed night and day. The property being only 11 miles from Haines station can be worked all winter.

**AT WORK.**—Jacksonville Times, Jan. 13: Des-selles & Connell, Simmons, Eunis & Co. and Wimer & Sons of Waldo precinct, Josephine county, are busily at work and will no doubt make a good showing this season. The miners are anxiously awaiting the end of the cold snap, as all are ready for an extended run. Should there be plenty of water this season the gold product will be large. The cold weather has suspended mining operations, but there is every probability that the frosty snap is at an end and there will be plenty of water when the first rain falls, as the ground was well soaked before the snow fell. A correspondent of the Times, under a late date, writes that W. J. Stanley of Woodville has started his arastra near that place and feels quite hopeful for the future of his ledge, as the quartz prospects well. It is said that parties from Portland are negotiating for the purchase of the property, and will probably put up a large mill on Evans creek, near Woodville.

#### UTAH.

**SULPHUR SHIPMENTS.**—Salt Lake Tribune, Jan. 14: The Dickert & Meyer Sulphur Co. are sending out refined sulphur at the rate of three carloads per week. They have a capacity at the mines of 20 tons per day, and this is susceptible of increase to any extent desired according to the demands of the market. The mines are located 26 miles from the Utah Central at Black Rock. Three teams, six horses each, are required to haul the sulphur to the railway, where there is a large warehouse, now filled partly with 300 tons, while at the works there is 250 tons ground, 50 tons flower of sulphur, and 500 tons lump, or such as has been taken from the furnaces in a pure state, ready to be ground or sublimated ready for market. These sulphur mines are the most interesting in America, in fact are the only mines of any extent, to produce sulphur. Only two furnaces are running at present. The mine is opened by cuts to the depth of 35 feet, exposing lots of ore, some of which runs as high as 98 per cent sulphur. The sulphur sent to market is practically chemically pure. The company employ at the mine and furnaces 35 men, 20 woodchoppers and numerous teams for hauling wood besides the teams to take out the commercial sulphur. Mr. Dickert was at the mine last week and found it under a deep coating of snow, but he brought away some fine specimens, some being so pure that when lighted by a match, burned and melted so as to run like heated butter. Mr. Dickert, in talking with a Tribune reporter, said that there was imported into the United States annually about 200,000 tons sulphur, while there was extracted from pyrites iron and copper ores 600,000 tons more in the manufacture of sulphuric acids, and if he was in better health he would feel like establishing here the manufacture of gun and other explosive powders, sulphuric acid and one special branch much needed, that of a manufactory of fertilizers in which sulphur and bones would form the chief ingredients. Sulphur extracted from pyrites contains arsenic in greater or less quantities; an article particularly beneficial in refining petroleum oils, for which such vast quantities are used, but unfitting it for many other uses in the arts. The Cove Creek mines supply most of the Pacific Coast with sulphur; ship east to Chicago, St. Louis, and would have a large trade with New Orleans if the railways would enable the company to send there,





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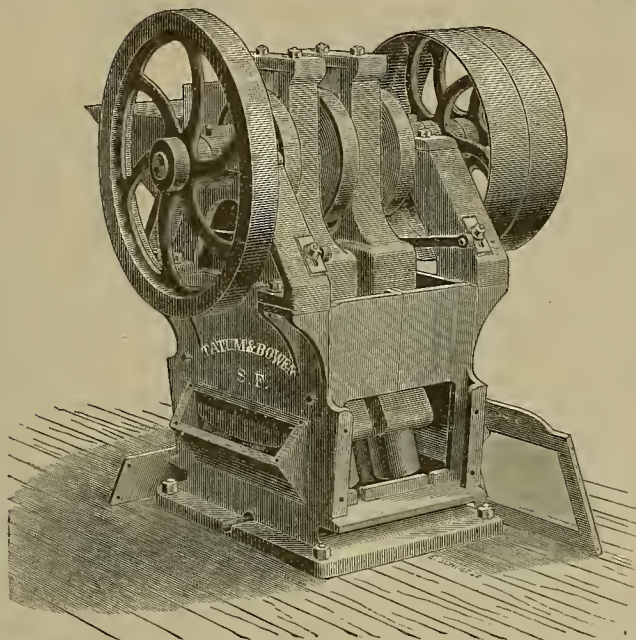
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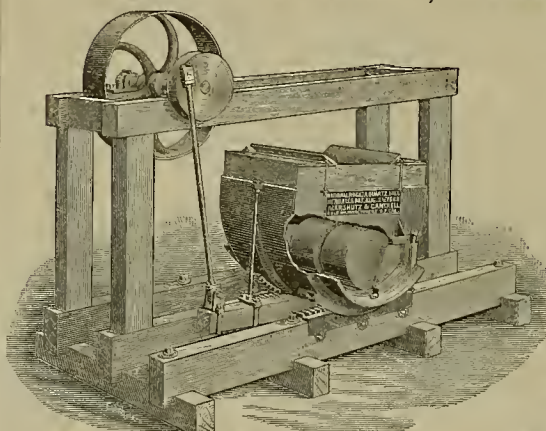
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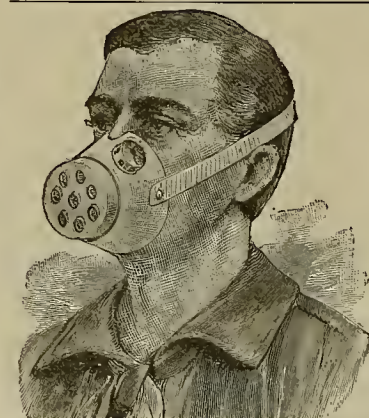
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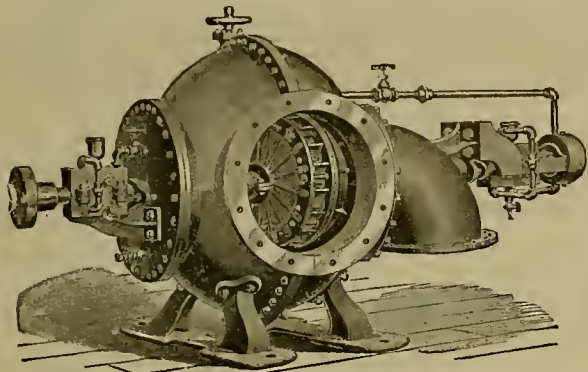
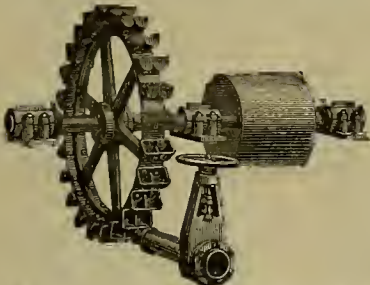
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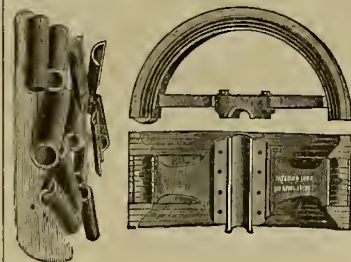
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## Forestry.

It is announced that the Forestry Commission will hold a meeting in their office in the Nevada block on January 24th. Messrs. Kinney and Bettner are expected to arrive from their southern homes, and John D. Spreckels, lately appointed as successor to Mr. Coleman, will take his seat in the board. Reports are expected from some of the large number of local forestry guardians which have been appointed, and other matters of importance are expected.

Word has been received from Senator Stanford that he will introduce a bill for the preservation of the forests somewhat different from that adopted by our board and submitted by them at the Santa Rosa convention. It has also been announced by telegraph that Senator Hale has introduced a bill, prepared by the American Foresters' Congress, to preserve the forests. It withdraws from entry as forest lands all public lands of the United States more valuable for their timber than for agricultural purposes. It institutes the office of Commissioner of Forests and authorizes the appointment of four assistant Commissioners. The Commissioner is instructed to form forest land into what are designated as forest reserves. He is given power to frame rules and regulations for the government of these reserves, and to appoint rangers to see that the rules are observed. No forest lands are to be sold, but the stumpage on them may be disposed of in the discretion of the Commissioner of Forests.

It is evident that more public attention is being drawn to forestry in all its branches than ever before in this country. The idea of preservation of forests from illegal and wasteful destruction is gaining force by public opinion and by the prosecutions which the Government is conducting against trespassers. It is certainly true, as has often been pointed out in our columns, that effective measures should be adopted to prevent our new country from following the hard experience which older countries have undergone and from which they are now putting forth such vigorous efforts to recover.

## Meetings and Elections.

CROCKER M. Co., Jan. 17.—Directors, Wm. Lyle (president), C. H. Fish (vice-president), A. W. Havens, Geo. Frier and Con O'Connor. August Waterman, secretary.

BLACK DIAMOND COAL M. Co., Jan. 14.—Directors, Thomas Bell, P. B. Cornwall, J. B. Haggins, Alvin Hayward and S. P. Smith. At subsequent meeting of the newly-elected board P. B. Cornwall was re-elected president and James H. Dobinson secretary.

SAN FRANCISCO GASLIGHT CO.—Directors, Joseph Durbrow, E. E. Eyre, Adam Grant, J. B. Crockett, Levi Strauss, James M. Donahue and D. T. Murphy. The only new names are James M. Donahue in place of P. J. Donahue and D. T. Murphy in place of J. B. Randol.

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

EXCELSIOR CONS. M. Co., Jan. 14. Location, Calaveras Co., Cal. Capital stock, \$5,000,000. Directors—D. M. Kent, D. H. Ward, S. Forman, S. S. Maser, S. L. Prindle.

SANTA CLARA MOLOING CO., Jan. 16. Object, dealing in picture-frames and moldings. Capital stock, \$50,000. Directors—Wm. Frank, Samuel McCall, P. E. Frank, Wm. C. Frank and A. H. Martin.

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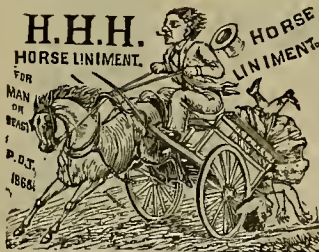
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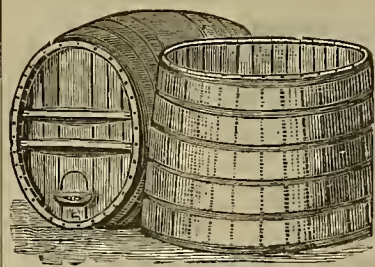
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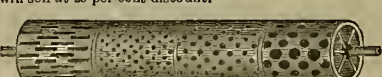
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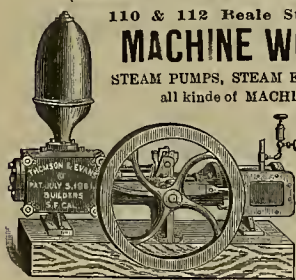
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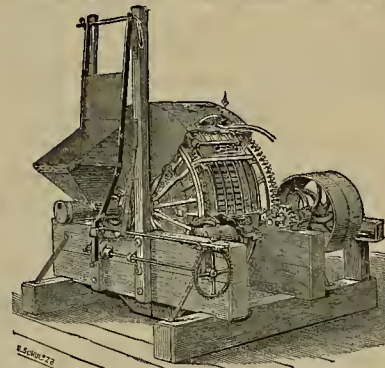
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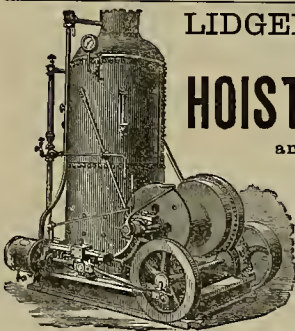
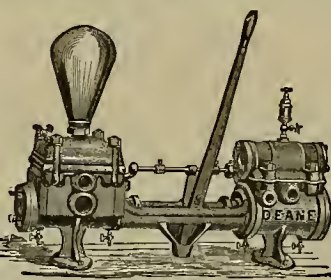
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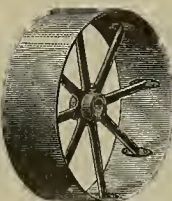
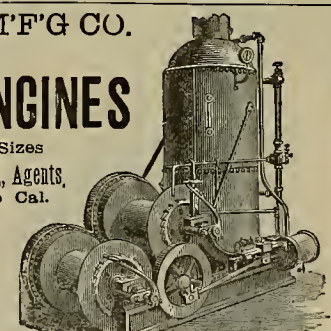
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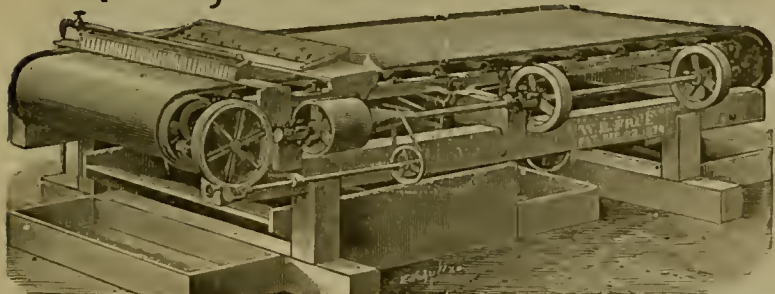
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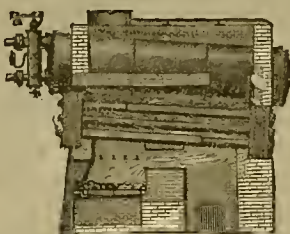
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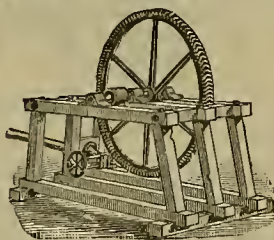
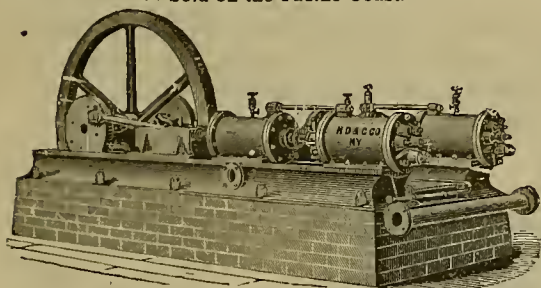
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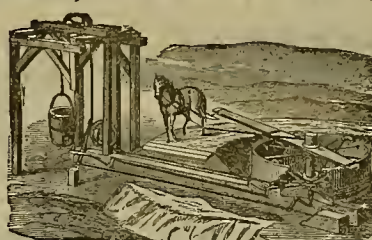
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All wrought iron. No gears, no breakage. One horse will easily handle rock or water to a depth of 350 feet, giving entire satisfaction to the prospector. Price, complete, \$200. 150 sold on this Coast.



NATIONAL ROCK DRILL.  
200 Sold on this Coast. Has less repairs than any other Drill.

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For SAVING GOLD!

IN QUARTZ, GRAVEL, OR PLACER MINES. MADE OF BEST SOFT LAKE SUPERIOR COPPER  
FULL WEIGHT OF SILVER AND BEST QUALITY OF WORK GUARANTEED.  
GET OUR PRICES BEFORE ORDERING ELSEWHERE. SAMPLES FURNISHED ON APPLICATION.

SAN FRANCISCO NOVELTY AND PLATING WORKS,  
No. 108 FIRST STREET.

NOTICE.—All our plates are guaranteed to have the full weight of silver agreed upon, and are tested before leaving our works, thereby avoiding the complaints about light weight, made so often before we started in this branch of industry.

JUSTINIAN CAIRE, Agent,  
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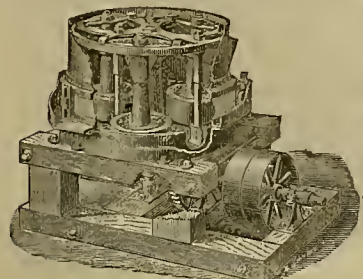
Centrifugal Roller Quartz Mills,  
CONCENTRATORS AND ORE CRUSHERS,

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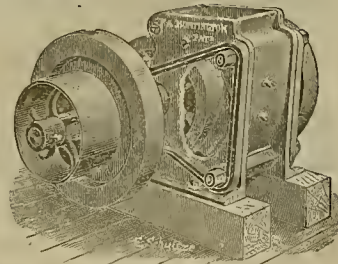
Steam Engines and Shingle Machines.

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No. 45 FREMONT STREET, - - SAN FRANCISCO, CAL.



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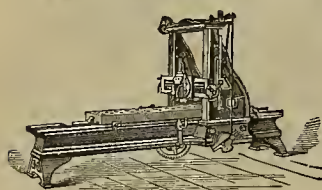
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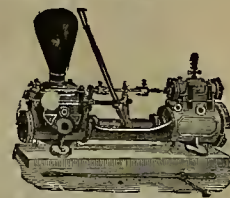


Putnam Planer.

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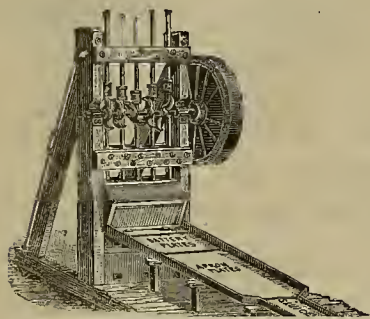
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Knowles Steam Pump  
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Nos. 21 and 23 FREMONT ST., and 8 CALIFORNIA ST., SAN FRANCISCO, CAL.

Mining Machinery, Steam Pumps, Wood and Iron Working Machinery  
**ENGINES and BOILERS.**

SEND FOR CIRCULARS.



## ATTENTION, GOLD MINERS!

WE ARE SELLING

### Silver-Plated Amalgamating Plates

For Saving Gold in QUARTZ, GRAVEL and PLACER MINING,

At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best, and far superior to others in weight of silver and durability. Old mining plates replated. These plates can also be purchased of JOHN TAYLOR & CO., cor. First and Mission Sts.

SAN FRANCISCO GOLD, SILVER and NICKEL PLATING WORKS,

E. G. DENNISTON, Proprietor.

653 &amp; 655 Mission St., San Francisco, Cal.

NOTICE.—Mining men are cautioned against fraud in purchasing poor mining plates made in this city; they have proved defective in the Silver-plating, and in having much less Silver than was contracted for. When in doubt make an assay; thin, light Silver-plating looks the same as heavy. SEND FOR CIRCULAR.



## PNEUMATIC PULVERIZER.

The principle of pulverization consists in the employment of two

### POWERFUL OPPOSING CURRENTS

Of dry super-heated steam, so arranged that they continuously charge themselves with crushed or granulated material, and by the great force and velocity of the steam currents the minerals are dashed against each other with such power of concussion as to cause the hardest ores to be pulverized to any degree of fineness desired. The high temperature of the super-heated steam currents employed, through which every minute particle of ore must pass, causes them to become very hot and dry, which produces a beneficial effect upon Sulphurets and ores containing rusty Gold. The light weight and simplicity of construction of the Pulverizer, the extremely small and inexpensive wearing parts, are the WONDER and SURPRISE of all who witness its operation. The Company is prepared to furnish complete plants for pulverizing

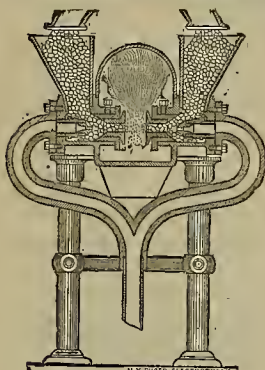
10 TO 200 TONS PER DAY,

Including a Sectional Steam Boiler supplying all the power required.

### PNEUMATIC PULVERIZER COMPANY,

2 and 4 Stone Street, NEW YORK.

Write for Particulars.

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Sectional View of Pulverizer.

**DEWEY & CO**  
**PATENT**  
**SOLICITORS.**  
220 MARKET ST. S.F.  
ELEVATOR 12 FRONT ST. S.F.

#### DIVIDEND NOTICE.

The German Savings and Loan Society.

For the half year ending December 31, 1887, the Board of Directors of the German Savings and Loan Society has declared a dividend at the rate of four and one-half (4 1/2) per cent per annum on term deposits, and three and three-fourths (3 3/4) per cent per annum on ordinary deposits, and payable on and after Tuesday, the 3d day of January, 1888. By order

GEO. LETTE, Secretary.

## H. P. GREGORY & CO.

Cor. Fremont and Mission Sts., - - San Francisco, Cal.

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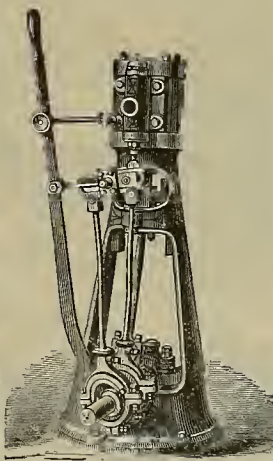
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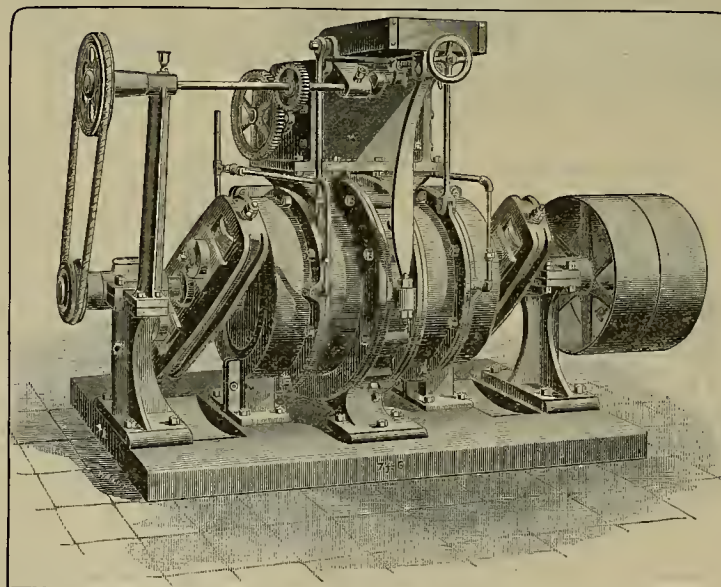
## ENGINES and BOILERS

FROM 2 TO 100 H. P., ALWAYS IN STOCK

MILL SUPPLIES AND LUBRICATING OILS.

## FRISBEE WET MILL.

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh. Our dry mills are the most economical ever built, and are extensively used with record of several years.

### FRISBEE-LUCOP MILL COMPANY,

GIDEON FRISBEE, Manager, - - - 461 Howard St., San Francisco.

HOOKER &amp; LAWRENCE, Gen'l Ag'ts, 145 Broadway, New York.



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, JANUARY 28, 1888.

VOLUME LV.  
Number 4.

## The Sergeant Rock-Drill.

After a thorough practical trial of the Sergeant rock-drill, a cut of which is shown on this page, the Ilex Mining Co. of Mokelumne Hill, Calaveras county, have ordered of the agents in this city, H. P. Gregory & Co., 14 drills of this make. They must have been well satisfied with the results accomplished by the machine to have given so extensive an order. The drill has an improved valve motion and rotating device which avoids some difficulties in ordinary drills and increases efficiency and durability. There have been many attempts made to construct a drill that would avoid the difficulties met both in tappet and steam-valve drills without adding new ones. The Sergeant was especially designed for this purpose. The makers claim that they have now perfected a drill combining all the good qualities of the tappet valve, which insure long life to the cylinder and piston and all the good qualities of the steam valve which give effectiveness. The valve in this drill is a perfectly balanced one, controlled by a single auxiliary valve moved by the piston in such a manner that durability and effectiveness are its permanent features.

In the Sergeant is a piston valve moved by the exhaust steam from opposite ends and an auxiliary slide valve moved by the piston to open and close the ports which control the movement of the main valve. This main valve is small, light and perfectly balanced; it is made of steel and hardened, and the time of its movement is not changed by wear or friction, oil or no oil.

There are no openings through the side of the cylinder, or ports for the piston to close in its movement; in fact, the piston and cylinder can be run and worn out without affecting the movement of the valve or the amount of work done by the drill. The auxiliary valve is also made of steel, with the ports on one side, and it travels in a groove which keeps it in its place. By placing the piston in the center of the cylinder and moving it back and forth for about half an inch, the auxiliary valve will move so as to open and close the ports which control the main valve, thus permitting a short stroke which can be used for blocking out holes. The arrangement of the auxiliary valve and ports is such that the main valve will not move until the piston or drill-bar strikes the rock when running full stroke.

By the arrangement of the openings or passages the valve is held in such a position that, while the piston and drill-bar is passing to the rock the exhaust remains open on one end, while the pressure remains on the other until the drill-bar is driven forcibly against the rock, at which time the valve will immediately reverse, having produced the most effective result.

The new rotating device has a release movement which prevents twisting of the spiral bar or breaking of pawls and ratchets. A strong steel spring is used instead of rubber for huffing, and only one spring at the upper end of the cylinder is required to prevent breakage by the piston striking either the front or back head.

The construction of the drill is such that it can be taken apart and put together in a few minutes. It is handled in the same manner as all percussion drills driven by steam or air.

The tripod has every adjustment wanted. The new patent clamp for holding the drill on the tripod, arm or column, has several ad-

vantages. The swinging jaw is brought to bear upon the cone on the back of the drill by a single bolt. The arrangement is such that the drill can be mounted and unmounted easily and quickly. The machine can be run loose on the clamps when required, and when tightened will hold with ease. Seven sizes of these rock-drills are now made, each having its special adaptation. The smallest has a cylinder of two-inch diameter and the largest, four inch.

The makers of this drill manufacture also a patent column and a patent quarry frame for

## The Copper Market.

According to all appearances the French syndicate, which cornered the copper market, will make a very good thing of it. These operations were far-reaching. They not only bought up stocks and that which was afloat, but engaged the product of various mines. The big Spanish and Chilean mines have sold to them and some mines in this country also. The directors of the Arizona Copper Co. have issued a circular in London in which official confirmation is given

## The Alien Land Law.

We have several times referred at length to the fact that the Alien Land Law Act has had a very detrimental effect on the mining interests of the Territories. The law applied only to the Territories, and was originally designed to prevent foreigners acquiring large bodies of land. Unfortunately, however, it was so carelessly drawn that it included mines as well. Now it happens that English companies have been investing heavy capital in mining in Idaho, Montana, Utah, New Mexico and Arizona, and would have invested more had this law not been passed. Of course they could hold the mining property acquired before the passage of the Act, but could not legally purchase any more. American miners holding claims were therefore unable to sell to foreign capitalists, and as American capitalists invest more readily in railroads, oil, stock, bonds, etc., and as a general rule care little for mines, the law worked a hardship on claim-owners. These English companies open their mines properly, put up expensive works and employ thousands of men. They have always benefited any mining camp they have invested in, and are looked upon favorably by the mining community.

There has been so much complaint about the law from the mining regions that Congress will doubtless remedy the matter this session. A bill to amend the law has been introduced by Senator Hearst of California, himself a prominent mine-owner. It is stated that the bill to amend the Act will be favorably reported by the Committee on Mines and Mining. The bill to amend is as follows:

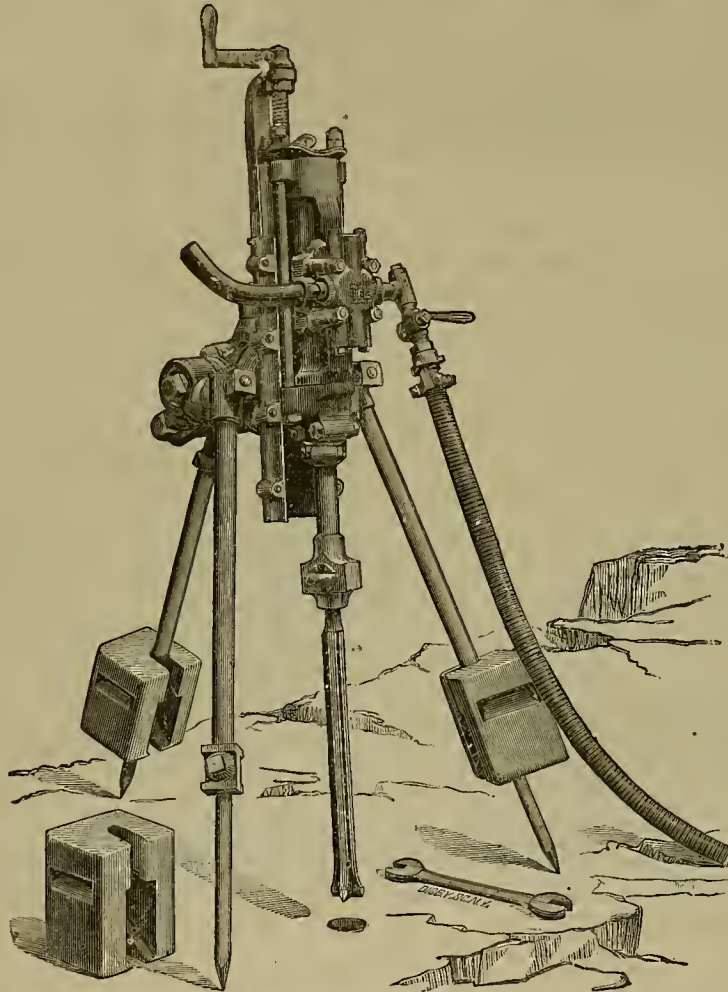
"This Act shall not relate to or in any manner affect the title to mineral lands or mining claims in the Territories of the United States which have been acquired or held under the mineral land laws of the United States, nor to mills or other reduction works, or property used in the production of metals from said mineral lands or claims; but as to all such mineral lands, mining claims, mills, reduction works and other property the laws of the United States and of the Territories shall be and remain the same as though this Act had not passed."

It is to be hoped that there will be no hesitation among the members of Congress in passing this amendment. The law as it now stands is a serious drawback to the mining industry in the Territories. The mining regions all need capital to develop them, and if the English or French will help the miners in this way, there should be no law to prevent them.

PRESIDENT CORBIN of the Reading Coal Mining Co. says that the company has in the past 12 years mined 51,000,000 tons of coal and paid to miners \$57,110,000. He says, moreover, that the net proceeds of this coal have been \$44,834,000, leaving an actual loss of \$12,270,000. The coal has been from \$5 to \$7 per ton in Philadelphia all that time.

DURING the past month the shipments of quicksilver from Calistoga, Napa county, have been unusually heavy, the advance in price having been an inducement for superintendents to mine their best ore, and obtain as much of it as possible.

THE House Naval Affairs Committee has agreed to report favorably to the House Mr. Morrow's bill appropriating \$175,000 for the repair of Admiral Farragut's old flagship, the Hartford.



THE SERGEANT ROCK-DRILL.

the drills. The rotation device in this drill is a specially effective one. The ratchet has internal teeth which are very durable. It has, in many instances, run for a year without any special care, and found to be in good order.

THE latest discovery of a gold mine in the East is 15 miles from Washington. Those interested have bought over 800 acres of land where there is "high-grade ore," averaging \$33 per ton. Wisconsin and Pennsylvania capitalists have gone into the scheme; but "800 acres of land with high-grade ore" sounds amusing to miners.

THE monument to Francis Scott Key, which was made in Italy, arrived in San Francisco this week, and will be at once placed in position in Golden Gate Park.

of the sale of the Arizona product to the French syndicate. The circular says the whole output of copper has been disposed of for three years on terms considered highly satisfactory to the board. It was the desire of the directors that the contract should be submitted to the stockholders for their approval, but the negotiators objected. The precise terms of the bargain are withheld under the stipulations, but the directors say that, basing their calculations throughout on the minimum estimation of production and on the minimum price stipulated in their new contract, they believe that the annual revenue from all sources for three years up to the 31st of December, 1890, will, on an average, be about \$80,000 per year. If the production can be maintained at what the board regards as its normal quantity, that amount will be considerably increased.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—EDS.

## Mining Regions of the Northwest.

EDITORS PRESS:—It is many years now since I had the pleasure of writing anything for the MINING AND SCIENTIFIC PRESS, which, from the first date of its existence, has always been such an able and faithful advocate of our mining interests. After the lapse of years, and perhaps the most energetic and costly mining operations ever known in the world, those interests do not bear the same importance to California in general, and San Francisco in particular, they did a quarter of a century ago. Other interests have superseded them in a measure, and we have now to look to the great Northwest—Montana, Idaho and Dakota and the Inland Empire, composed of Washington Territory and Oregon—for the mineral wealth which is to uphold the predominance of the Pacific Slope it has so long held in the production of the precious metals.

But, though placer digging is not what it was, though hydraulic mining is prohibited by law, and though the glory of Washoe has become a tradition of history, I feel assured the spirit and enterprise of our people, which built up the Pacific Slope, has not died out, and that they will be glad to know something more than they do of the vast extent and endless wealth of the Northwest in its recently discovered silver-lead mines, reaching from Cœur d'Alene, in Idaho, to Wallawa county, in Eastern Oregon, a distance but little short of 300 miles.

Nearly three years ago I relinquished journalism in San Francisco to go to Cœur d'Alene, and so was on the spot when the great Bunker Hill and Sullivan mines were discovered. I have not space in one article, a mere sketch too, as this one is, to go into details of the capacity and produce of all the principal mines in Cœur d'Alene; but, I can safely say, for unbroken continuity and general richness they have no equal to-day, nor ever had before in any period of the world's mining history. The total length of the silver-lead mines in Cœur d'Alene is just 65 miles and 15 miles in width, beginning at Wolf Lodge on the lake and ending at the Montana boundary line. The south fork of the Cœur d'Alene river from Old Mission, where it joins the lake, runs pretty straight due east and west to the Montana boundary line. Along this river, at every two or three miles, are long ravines on both sides, not at all difficult of access, on which the mines are located. Passing over Pine and Government creeks to Milo creek, on which Wardner is located, we reach the first great mines of the district as proved by development. The Sullivan, on the southeast side of the creek, is now tunneled 1000 feet deep and over 600 feet into the hill. The vein has run from 10 to 50 in width, averaging 30 feet, and the ore in the lowest tunnel now pays \$150 to the ton. The Sullivan and its sister mine, the Bunker Hill, were recently purchased by Mr. Sam Reed, a leading capitalist of Portland, for \$1,500,000, and if worked to their utmost capacity and with the same vigor the mines at Washoe were worked, and the mines at Butte City and Leadville are worked, it is not an exaggeration, taking the average pay from the first as a guide, to say they would easily yield \$5,000,000 a year. At present they are not worked to their capacity or anything near it. On the same ledge to the northwest are the Lackawanna, Homestake, Richmond, Emma, Stenwinder, Tyler and Sierra Nevada, all of which are producing mines, and as great in pay and capacity as the Sullivan and Bunker Hill; but I have always held the Sierra Nevada will prove the richest silver-lead in America when thoroughly opened and worked to its full capacity. It is now paying \$18,000 a month.

Twelve miles above is Wallace, another new town, growing up rapidly in importance from being the center of an immense number of great mines and from being at present the terminus of the railroad. In this section are the Tiger, held at \$500,000; the Poorman, recently sold for \$300,000, and a number of others on Canyon creek, bonded and sold for sums ranging from \$15,000 to \$40,000, the ultimate value of which, however, is now greatly increased by Mr. Glidden's railroad which goes from Wallace up the canyon to the mines. The Gem, Badger, San Francisco, Oreonogo, Black Bear, Diamond Hitch, Granite, Black Cloud, California, Monarch and many others in this section, are all great mines. Nine miles above Wallace comes Mullan, the last settlement of Cœur d'Alene near the boundary line of Montana. In this district, containing about 15 square miles, there are 142 recorded locations, 90 of which will prove valuable mines. Among these are the Hunter, sold last year to Dennis Ryan of St. Paul for \$100,000, and cheap at that, in fact, one of the biggest bargains of the year; the Morning and Evening lodes, sold for \$40,000, with a host of others I have not time to recapitulate.

Passing on through Montana to St. Regis and Salmon river, the formation shows itself in equal splendor until Wallawa county in Eastern Oregon is reached, nearly 300 miles, and thence to Pine creek, some 200 miles farther. In Wallawa county, where I am now personally interested, the veins are not so wide, so far as known, but the surface ore is much richer, run-

ning on an average at the very grass roots from \$65 to \$350 a ton. In addition to the silver-lead mines in this section, there are marble, tin, zinc, and other rich productions, with the finest possible climate for working and opportunities for tunneling to any depth. Our tunnel is now in 200 feet with probably 90 more to go, and will be finished by April. I think the results of the tunnel will cause an immense excitement. The ledge here is developed, in a measure, for 30 miles. The marble, at present prices, ranges from \$6 to \$8 a cubic foot, which makes it worth from \$72 to \$96 a ton, and we can lay it down in Portland and San Francisco at \$50 a ton profit, and supply the whole coast. Several of the leading marble men of Portland and San Francisco have examined my samples and all pronounce them of the very purest character.

It has been said, "once a Californian always a Californian." I landed in San Francisco in 1849, and seeing the State grow up from a wilderness, I have been a very earnest and very sincere Californian. But my experience during the last year compels me in all honesty to confess that, to-day, for mineral and agricultural wealth, Oregon is the richest State in the Union. The connection of the two States by rail will do for the Pacific Coast precisely what connecting the two oceans by rail did for the whole nation. It is one of the grandest works our people have ever accomplished, and by consolidating the interests of the coast from San Diego to Puget Sound, it makes it a world within a world, greater and grander than the continent of Europe, because the home of freemen who have a free-simple right in the land, and because it teems with everything required to increase their wealth and happiness. Even in well-informed circles in San Francisco, I find, the grossest ignorance prevails about the varied resources of Oregon and the Northwest. But railroad connection, which makes travel cheap, easy and expeditious, will soon dispel this ignorance and compel a progress in those far-off regions which no one can dream of now. The future growth and greatness of the Northwest, from Oregon to Cœur d'Alene, will be even more wonderful than the growth and greatness of California has been—for it is based on a mineral foundation, which, though not so phenomenally rich as Washoe, is infinitely more permanent and cannot be exhausted for centuries.

LEIGH HARNETT.

## Mexican Mines.

## The Minas Prietas in Sonora.

EDITORS PRESS:—The history of the Minas Prietas, in Sonora, shows that sometimes there are opportunities to make of an abandoned mine a profitable one, provided it is undertaken with a combination of good judgment and sufficient capital. The Minas Prietas ledge is a large one, sometimes 100 feet between walls, and the pay streak varies from 4 to 20 feet, narrowing and widening alternately. The bulk of the mineral is a low-grade free-gold ore, easily worked by amalgamation and carrying a varying quantity of silver ore, sometimes as high as 10 ounces silver per ton, of which, however, no account is taken in the working of the gold ore, consequently it is lost in the tailings, because, as I am informed, it cannot be saved by concentration.

The mine was discovered and worked more than 100 years ago for the Marquis of Coloma, a grandee of Spain, but for silver only, to a depth of merely 90 feet and then sold to different parties alternately, who worked or tried to work it with varying success and unsuccess till it came into the hands of an English company. Only then began the serious development and profitable working of the hitherto quasi-neglected property. The deep working of the mine began, shafts were sunk and drifts run, which proved a large quantity of pay ore below, and which justified the building of a fine mill capable of running 80 stamps and 20 combination pans, though for the present there is only half of this machinery in place. The plant of the mill consists of four tubular boilers 16 feet long, of a splendid automatic cut-off engine of five-foot stroke, with fly-wheel 16 feet diameter and main pulley and belt 43 inches wide, which are used to set in motion 40 stamps, 10 combination pans, 5 settlers and one or two smaller pans. All this machinery was built at the Union Iron Works, San Francisco, and speaks for itself, so loud, in fact, when running, that one can hear it a mile off. The water used in the boilers and in the mill is pumped out of the mine, and, not having too much of it, is pumped from the tailing reservoir back to the mill again, where it is used over and over in the batteries or in the pans.

The English company has now worked this mine for about five years, and formerly ran about 160 tons of ore daily through the mill, till some years ago it was proved that by closer working, i. e., grinding, the daily yield of 100 tons would equal the former yield of 160 tons. Of course this better method of amalgamation was adopted, and the average work was 100 tons daily; last year 37,000 tons of ore were worked, yielding about \$10 to \$12 gold per ton.

Owing to various causes, only tailings were worked this year, which keeps pans and settlers and a reduced force of millmen busy, while the stamps wait in gloomy silence for their daily feed of ore, which is now sought for

on and below the 600-foot level; and it is expected that soon the voracious jaws of the rock-breakers will be set to swallow tons and tons.

Next time I expect to send you some details of another large mine—a silver mine—acquired by an English company. While Sonora is, so to say, at the door of California, there are only a few California miners here, and few, if any, specific California companies at work; while the Eastern capitalists and the English are on the lookout and not slow nor afraid to avail themselves of the chances occasionally to be had. Millions of English and Eastern capital is thus employed—profitably, too, when carefully invested and intelligently and honestly administered, as this sketch has tried to show.

THEO. G. E. WOLLEK.

Hermosillo, January, 1888.

## Natural Gas in California.

A few miles from the new town of Sutter City, near the road passing through the Buttes toward Meridian, a shaft was sunk some 16 years ago by parties prospecting for coal and other minerals. The shaft was about four feet in diameter and was carried down to a depth of about 40 feet. One day a man named Cook was working in the bottom of the shaft, and as he struck a blow with his pick a rush of gas came forth. It ignited from the flame of his candle and a violent explosion followed. The flame immediately rose to the top of the shaft and the windlass was blown away. Cook was thrown down by the force of the explosion, and his fellow-workmen at the top of the shaft had a great deal of difficulty in rescuing him from his dangerous situation. They first smothered the fire by covering the shaft, and then succeeded in raising him to the surface. At that time no one supposed that natural gas had any value, and work was abandoned in the shaft. It was subsequently covered over with boards and brush, in which condition it remains to this time.

The land on which this shaft is situated is owned by Eli Davis, and is used by him as a sheep ranch. He has recently become interested in the subject of natural gas, and means to take steps for the development of the prospect on his place. He visited the shaft the other day, and was well pleased with the indications. Some time since a short piece of iron gas pipe, an inch in diameter, was thrust through the boards and rubbish covering the shaft, so as to permit the escape of the gas. The gas readily lights from this pipe, and continues burning until blown out by the wind. Mr. Davis saw it burn the other day for a full hour, and he could see it still burning after he left the spot. It is probable that a company will be organized shortly to develop the excellent prospect of gas now afforded by the shaft.

The value of the natural gas annually consumed in the United States is estimated at about \$10,000,000. Many towns and cities use it for light and heat in the coal and oil regions of Ohio and Pennsylvania. The gas is carried many miles in pipes from place to place, as the pressure is usually great. Should a good supply be tapped in the Buttes, it would create a great boom for Sutter City, which would at once be provided with cheap fuel for manufacturing and all other purposes, and be brilliantly lighted by gas at a small expense.

The Buttes may yet prove to be rich in mineral wealth of various sorts. A gold placer has been worked in them, and good prospects of coal have been obtained. Near Sutter City there is a quarry of building stone from which a house has been constructed. Recently a substance supposed to be mineral paint has been discovered near the quarry, and a white material, believed to be porcelain clay, has also been found. The field is worthy the careful attention of prospectors.—*Marysville Appeal*.

NOT WORKING THE BORAX MINES.—Richard B. Flynn, owner of a silver mine in Inyo county, told an *Examiner* reporter that nearly all the borax mines of Inyo, San Bernardino and El Dorado counties have virtually ceased work because of the low price of borax. W. T. Coleman's large borax works in Death valley, John Searls' works in San Bernardino, and numerous others that were employing from 35 to 50 men each, are now working but a straggling half dozen or less, and some are not doing anything.

PETER F. CLERC has brought suit against the Hubert Concentrator Company to enjoin it from alienating its letters patent. As he alleges that the corporation is insolvent, he also asks that a receiver be appointed to sell them in satisfaction of a default judgment for \$216.50, obtained by Clerc and Joseph C. Stebbins in June last, the letters being the only property upon which execution can be levied.

CAPTAIN SMITH'S coal mine on the line of the California & Nevada railroad has not proved to be a mine of wealth, and further experimenting has been dispensed with. The vein as it appeared was only a few inches in thickness. Captain Smith says the coal was good what there was of it, but there was very little of it.

THE Coronado Beach Co. has concluded hereafter to use crude petroleum as fuel exclusively on the ferry-boat, motor line and hotel machinery.

## Utilizing Flax Fiber.

The idea of using home-grown flax fiber to supplant the large quantities of twine and other manufactured articles which are now brought here from a distance has been a recurring subject for discussion for years. Several efforts have been put forth to establish factories which it was hoped would begin with coarse linen manufactures and gradually work up to higher and finer products. For some reason or other these undertakings have not hitherto reached a successful basis, but it is encouraging to know that effort is still being put forth, and it certainly appears, upon *a priori* grounds at least, that we should have manufactures of this kind in profitable working. The latest announcement looking in this direction is the starting of a twine factory in East Oakland adjoining the cotton-mills. The *Chronicle* gives this account of the origin of the enterprise:

"The manager and principal owner, Mr. Bruce, was formerly in the employ of the cotton-mills, and during a visit to the coast counties saw some samples of flax straw which he recognized as equal to the best French flax, and the idea occurred to him that its manufacture into twine could be made profitable in this State. Considerable flax is grown along the coast for the seed, which is sold to the linseed oil factories of San Francisco, but the straw has heretofore been thrown away as useless. He interested a few capitalists, among them Daniel Suter of San Francisco, and the plant for the mills was procured. About one dozen machines are now in operation manufacturing flax twine, which commands a price in California that makes the manufacture profitable. Mr. Bruce, who has had considerable experience in the flax industry, as operated in Scotland, states that the coast soil, with its damp, foggy climate, is peculiarly adapted for flax growth, producing a strong and fine fiber. The more fog the better for the fiber. The straw, he states, is as valuable as the seed, and farmers may thus make a double profit. An acre will produce two tons of straw and 1000 pounds of seed. The straw is worth about \$12.50 per ton and the seed 2½ cents per pound, or a gross income of \$50 per acre."

We do not vouch for the estimate of crop and values. It has been claimed by some that the condition required in seed and in fiber by the users of each prevented both from being utilized from the same plant; that a plant which fully matured its seed had gone too far to yield the best fiber. We are not practically informed on that subject. We know, however, that where the flax industry is important, as in some European countries, they have different varieties of flax, of higher growth than the seed flax grown in this State, which are advocated by fiber growers. A collection of fiber varieties was secured some time ago by the State University and has been grown from year to year at Berkeley.

## Mining Camp Nuisances.

There is much complaint in Idaho and Montana of a class of blackmailers in the various mining towns and camps, who will allow no important sale of mining property to proceed unless they are bought off; otherwise they interfere with the proposed sale in every possible way. They decry the mine as an ore-producer, assert that it will not prove permanent, or hint that there will be trouble in regard to the title. As the reputation of a mine is about as tender as that of a woman, a mere hint is often enough to break off a sale. It is not only in Montana and Idaho that such men are to be found. They hang about all mining camps and come to the front whenever a big sale is about to be consummated. Unless their mouths are closed with a golden seal, there is nothing too bad for them to say of a mining property that is about to be disposed of for a large sum. In the early days of the Comstock a good deal of this dirty work was seen.

Besides the regular blackmailers, there is in every camp a class of envious persons who have mining claims on which they have for years been incubating, merely doing "holding work," who cannot endure to see men of capital come into their camp and open negotiations for any other property than their own. These men will get around and interfere to break up a sale, hoping to dispose of a claim owned by themselves if they can alarm the would-be purchasers in regard to the mine for which they are negotiating. The result generally is that the men of capital either become frightened or disgusted, and, folding their tent like the Arab, steal away. Another nuisance in a mining camp is the class who come to the front the moment a rich strike is made in a mine. Then they rush in with a capped-up claim of some kind to the property. It is either on the extension of a vein they are working or is on ground located by them at some time. These fellows will allow men to hold peaceable possession of a piece of mining ground and expend on it coin and labor for years without saying a word, but when a big strike is made they are as noisy and ravenous as coyotes.—*Virginia Enterprise*.

A DUMMY ROAN at Monterey is to be built to connect the Hotel Del Monte, Monterey, New Monterey, Pacific Grove, Point Cypress and Pesadero beach.



## Driving the Jack-Rabbits.

We present on this page an ideal sketch of one of the rabbit-drives which are becoming so popular on the plains of the upper San Joaquin valley. The plan first put in practice near Pixley two months ago, and since repeatedly pursued there with so gratifying results, has been adopted in Kern county with even greater success.

The Bakersfield people celebrated New Year's Monday with their initial round-up of the rabbits, at Henry Borgwardt's ranch, four miles from town, westward. There was a circular corral at the corner of his alfalfa-field where the sagebrush and pasture lie side by side. From this inclosure two wings of lath fence were stretched at right angles for a few hundred yards.

By 2 o'clock in the afternoon a large number of people had gathered, some on horseback,

cruel sport, but their destruction is an inexorable necessity. Relentless war must be waged against them or they will take entire possession of the country."

Our picture calls for but little explanation. The upper left-hand corner gives a ground plan of the fence. The line of beaters would of course be thrown much farther off and more in the form of a semi-circle at the beginning of the drive while the persons would be more widely scattered.

This method of dealing with the destructive rodents bids fair to become quite general, where they abound and the lay of the land favors; and as our "rabbits" are all *hares*, which know not the trick of escaping into burrows, the results of the process are comparatively certain. The conceit of the artist in the lower corner must be a melancholy reminiscence of the days before drives were introduced.

At Bakersfield, Kern Co., on Jan. 10th there was a great rabbit-drive. The account of the affair given in the *Echo* of Jan. 12th is so sprightly, and contains so many valuable prac-

captains, were placed at the extreme right and left wings. The whole command formed a semi-circle.

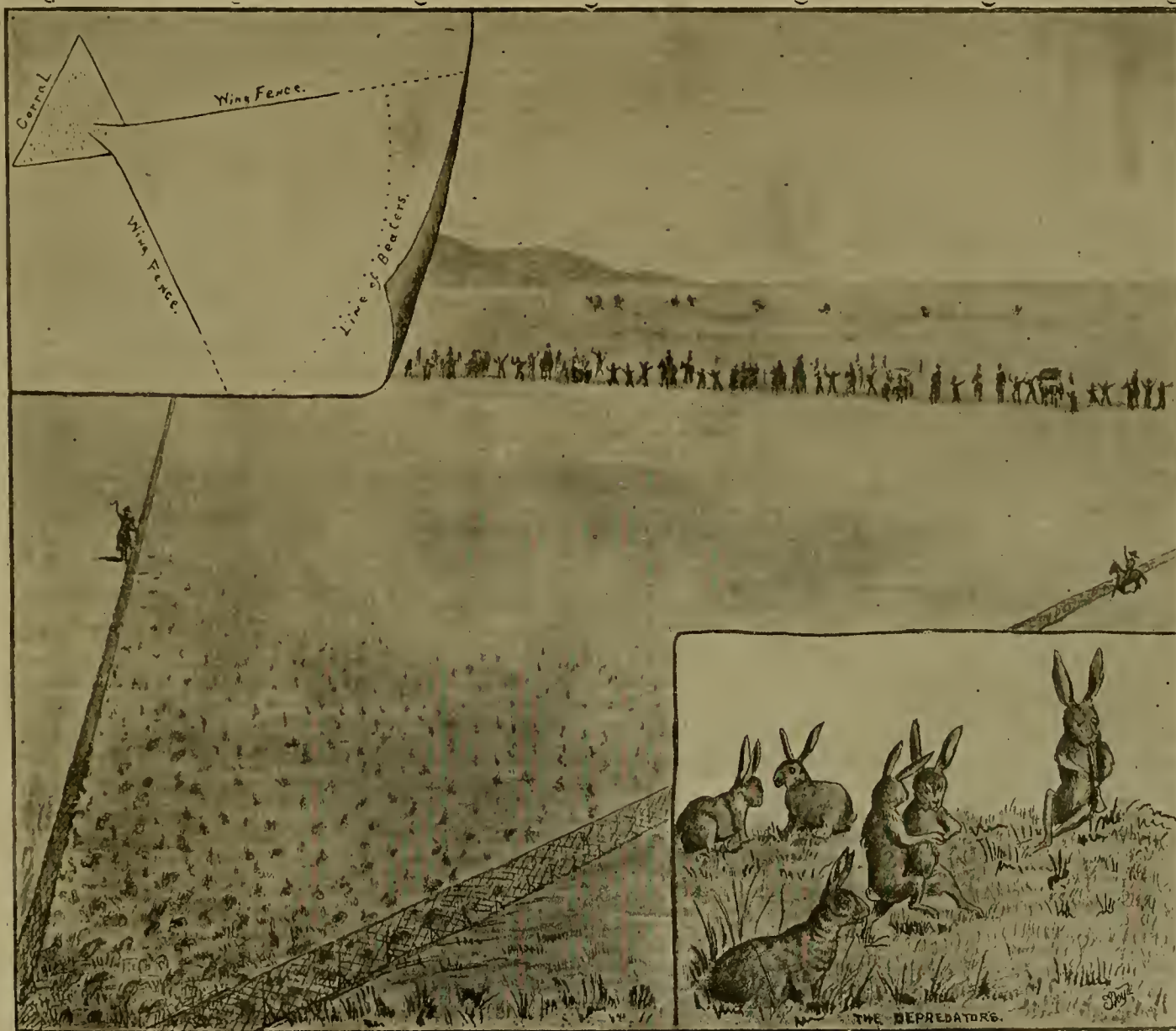
When all were in position, the commander raised his handkerchief, the signal for the start; this was repeated by his assistants and the captains, and simultaneously the whole line began a quiet work toward the corrals. At first the rabbits trotted slowly ahead of the drivers, but soon the horsemen on the left wing opened up a general shout, *contrary to the program*, which so excited the rabbits that they turned toward the right wing and ever so hard work of those in charge of that wing could not keep half of them from passing the line.

As the circle gradually closed, the drivers made a more compact body, so that when they reached the rabbit-tight wings there was little chance for a rabbit to go back without encountering one of the clubs in the hands of the foot-men; hundreds of them were killed in this way.

Just before the gate to the corral was reached, there was a general disposition on the

## Mining in Alaska.

This is a poor country for a man without money or to go broke in. Miners' wages are only \$2 per day, and labor in the rain and snow at that. It has stormed 57 days out of 72 since I have been here. At this writing it is dry and cold—thermometer six degrees above zero. This is the worst country to prospect in I ever found. I tried prospecting for a week, and as a last resort went to work at my trade. I worked 61½ days at \$1 per day and boarded myself; bought a stove for \$26 and did my own cooking. I did the work on an 80-stamp mill and it is finished, but won't start to work before spring, as the company has no ore on the dump, and it snows two days out of every three on an average. White men will not work in the storms. Indians do nearly all the mining here. Men, women and children are compelled to wear rubber or oil clothing here. This town of Juneau is on the mainland. The two largest quartz-mills are on Douglas



IDEAL SKETCH OF A RABBIT-DRIVE AS PRACTICED IN THE GREAT VALLEY OF CALIFORNIA.

others in light vehicles. They had a commanding officer and a few field managers. No dogs were allowed upon the ground, and but a few guns in the hands of experienced sportsmen. The crowd having been so distributed and marshaled as to form a curving line about a mile in length, a signal to move forward was given and the drive toward the corral commenced. The area inclosed by the drivers must have been less than a square mile, but the *Echo* says that "as they drew near the apex of the triangle it seemed as if there were acres of rabbits. Of course a great many ran back past the people, and several hundred were killed with sticks while doing so, their fright being so great that they would run within a few feet of one's conveyance. When the corral gate was shut it was found that the drive had been a grand success. By actual count after they were killed, there were 1126 rabbits in the pen. Another march was ordered, and by passing over the same territory 796 rabbits were corraled and killed, besides a large number that fell by the way. It was generally believed that 2500 was a safe estimate of the total number killed in the two drives."

Of course no firearms whatever can be used inside the corral; only clubs are permissible. Another observer writes: "It looked like very

tical hints as to how a drive must be managed in order to secure the greatest success, that we quote it bodily:

In accordance with posters generally circulated about Bakersfield, a second rabbit-drive took place at H. L. Borgwardt's ranch, the same place as the former one. At 1:30, the hour set for the meeting, at least 500 people had assembled on the grounds, and after partaking of the generous lunch prepared by Messrs. Swain and Borgwardt, proceeded to the place where the drive was to be held.

Preceding this, Commander McCord had sent a large delegation of horsemen to "round up" the rabbits in the field west of that where the principal work was to be done, so that by the time the crowd was ready to move in a body to the place where the drive was to commence, hundreds of rabbits had been driven out before them.

Companies were rapidly organized, 20 men on foot being assigned to each captain who was mounted. Eleven companies of men and boys were given positions, and two of ladies and girls under command of lady captains; and it is claimed by those present that more enthusiastic hard work was done by the latter than by any one else. Two large companies of men and boys on horseback, commanded by competent

part of the rabbits to turn toward the crowd. Had the latter been held in check for a minute, so as to give the rabbits an opportunity to see the gate, every rabbit would have been captured; but there was no such delay, and the result was that nearly half of them went through the crowd.

It was estimated that 2000 were corraled this drive. They were speedily killed with clubs, and a second drive ordered. Commander McCord sent a large force of horsemen into the field north of the one where the main drive was held, to drive the rabbits in front of the companies, and it proved to be an excellent move, as it increased the count in the next drive by at least 1000. Aside from the shouting by those on horseback, the last drive was as near a success as any one could wish. At the close, when fully 3000 rabbits were massed in front of the gate, undecided which way to turn, the commander and his assistants held the crowd in check until the rabbits started for the gate, when a general rush was made, and in an instant 3000 more rabbits were in the corral. After the killing, a count was ordered and the number was 5075 in the corrals, and it was estimated that at least 500 were killed on the outside. This would total over 8000 rabbits killed inside of one week on a field of less than 300 acres.

island. The Treadwell mill runs 160 stamps. Their gold lode is 600 feet wide. The mountains are from 4000 to 5000 feet high, and all the canyons have large glaciers. I viewed one six miles in length. On Glacier creek there is one 26 miles in length—12 miles up the bay. The sun sets here at 3 P. M. and rises at 9 A. M. Times are duller here than in any California town I can think of. In winter all the idle men go to Puget Sound. The wind has been blowing terribly for four days, and I have abided most of that time by my stove. The mail steamer comes to visit us once a month, and it is with great anxiety I look for it. I am 700 miles from Portland. Via that place is the way to come to this country to connect with steamers. The fare from Portland to this place is \$50 cabin or \$30 steerage.—Juneau Cor. *Anderson Enterprise*.

MANY of the farmers and lumbermen in Northern Michigan are making use of dogs this winter to draw the sleds. It is said that the dogs become quite expert at the work after a little training, and in many ways equal the Esquimaux dogs.

A FLAX factory has recently been started in East Oakland.





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SAN FRANCISCO

Saturday Morning, Jan. 28, 1888.

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## Passing Events.

It is not often we are called upon to chronicle disastrous and fatal accidents in the coal mines of this coast, but an explosion occurred this week in the Wellington mines by which many miners lost their lives. An account of the accident is given in another column.

The warm rains of the past week have melted the ice which formed during the cold spell, and a number of mills which were closed down have gone to work again.

The people up on the Comstock are about to use compressed air instead of wire rope for transmitting to the surface the power generated by operating the Pelton water-wheel underground in the C. & C. shaft. The old project of utilizing the power in the Carson river for compressing air to be used at the mines is also again being talked of.

Efforts are being made in Congress to amend the Alien Land law so that its provision will not apply to mining property. It will be but justice to the mining community to change the law as it at present stands.

The burning of iron-stone sewer-pipes has been commenced at the Clark Pottery Works, Alameda. There are orders enough on hand to keep the works running for the coming six months to supply the demands in the southern part of the State alone.

From 50 to 60 degrees below zero was the record last week at a dozen places in Central and Western Montana.

## California Mining Machinery.

In a recent number of an Australian journal was published a report of the Government Geologist and the Government Chief Inspector of Mines on a plant of machinery for the working ores, which was sent there from California by a San Francisco firm. The plant received the highest praise from these officials, who especially commended the labor-saving features. They also called special attention to the concentrating machinery and the effectiveness of the Frue vanners. Their published report was in the highest degree complimentary to the California-made machinery for working gold ores, and it was the opinion of these officials that it would be adopted to the great benefit of the colony.

In another Australian journal, also of recent date, is an announcement that W. H. Patton of the "Broken Hill" mines has recommended and ordered a complete plant of concentrating machinery from England, for use at these mines.

Here we have the rather curious circumstance of English officials recommending the use of American mining machinery because of its efficiency, and an American mining engineer recommending the purchase of English machinery.

Mr. W. H. Patton is very well known on this coast, first from his connection in mining matters in Sierra county, and then from the prominent position he occupied on the Comstock, Nevada, for so many years. It is not so very long since he resigned the superintendency of a half-dozen or more Comstock mines to go out to the famous Broken Hill mine, Australia. All the reputation he ever gained was made in Nevada, where he has had the credit of designing some of the most elaborate and expensive mining machinery ever built. That a good deal of this credit was really due to others has been pretty well understood here, especially among the foundrymen where the machinery was built. Some of the draughtsmen in little dingy up-stairs offices, some of the mechanical engineers such as Behr, Salkeld and Eckart and some of the superintendents of the foundries, could tell who really designed some of the machinery if they saw fit. But Mr. Patton got the credit always, the general plan of the design naturally swallowing up any matter of details suggested by others.

Why Mr. Patton should now, on his first opportunity, order machinery made in England, instead of in San Francisco, is not easy to understand. England is not noted for her gold or silver mines or gold or silver mining machinery. They have made no specialty of that, and we have. More or less is being shipped from here to the Australian colonies every steamer, and of late the orders are more numerous than ever. It would seem that if the people over in Australia thought enough of Mr. Patton's talent to get him from here, he might have thought enough of the place where he made his reputation to get the machinery needed from here, more especially since in this special class of machinery our foundrymen and designers have had the greatest experience.

**A BIG PAY-ROLL.**—Timothy Hopkins, Treasurer of the Southern Pacific Company, says that the pay-roll of its Sacramento employes this winter is between \$350,000 and \$400,000 a month. Two thousand skilled workmen are now at work in the shops at that place, and they receive from \$3.50 to \$4.50 a day. The present monthly pay-roll for the road west of El Paso and Ogden is about \$1,000,000, and for the past 12 months the company has disbursed about \$12,000,000 in wages.

It appears that the big strike made at Victor, San Bernardino county, Cal., was through the work of the elements. A dispatch says: "An immense washout, making a basin some 500 feet deep, exposed a vein some 30 feet wide and about 100 feet in depth on the ledge, which dips at an angle of about 20 degrees into the mountain. The whole mass assays about \$15 a ton, and a number of smaller veins, from 10 to 30 inches wide, which assay from \$40 to \$60 per ton."

The Supreme Court of New Mexico has rendered a decision holding that a Mexican grant had been floated over \$1,000,000 worth of land which does not belong in it, and that the land is part of the public domain.

BUTTE, M. T., now pays \$8 a cord for its wood.

## The Magnetic Variation at San Francisco.

## Rule for Computing the Variation.

The maximum of the easterly variation of the magnetic needle at San Francisco is very close at hand, and Mr. F. M. Thorn, the superintendent of the U. S. Coast and Geodetic Survey, has authorized Prof. George Davidson to make known such facts relating thereto, gathered during the last few years, as are of interest to engineers and surveyors.

The superintendent's annual report for 1886 contains an exhaustive paper by Assistant Schott upon the secular variation of the magnetic declination. The secular variation of the magnetic declination is the long period which intervenes between two consecutive maxima of the direction of the needle. On the Atlantic Coast the length of this period is probably 250 years. At New York the maximum westerly variation was about 9° in 1680, the minimum was reached about 1795, and the second maximum will progress some years beyond 1900. In 1795 the agonic (or line of no variation) passed parallel to and nearly along the western side of Chesapeake bay, (generally to the N. N. W.) near Washington, Harrisburg, and west of Buffalo and Toronto.

In 1885, this agonic leaves the Atlantic Coast nearly midway between Washington and Charleston, passes Zanesville, Saginaw, etc. On the east side of this agonic line, to and across the Atlantic ocean, the magnetic variation is westerly; on the western side to and across the Pacific ocean the variation is easterly.

On the Pacific Coast there is a narrow belt of the seahoard where the direction of the needle at the present time is stationary; this is the region of the extreme easterly variation.

This narrow belt is well determined from Vancouver to Cape San Lucas. It very closely follows the coast line from the Straits of Fuca to San Diego, and then sweeps around the head of the Gulf of California down the eastern shore to latitude 26° and then southwesterly diagonally across the gulf to the eastern shore of the peninsula of Lower California.

Cape Mendocino and the coast to the northward to latitude 44° are included in this narrow belt. At latitude 39½°, 30 miles northward of Point Arena, it leaves the coast line and sweeps southwesterly, passing over Suisun bay and continuing slightly inland until it strikes the coast again at Santa Monica bay. At the mouth of the Columbia river the maximum limit of the easterly variation has not been reached, but the annual change is quite small. At Port Townsend and over the waters of the Straits of Fuca, Puget Sound and the Gulf of Georgia the maximum has been reached and the variation is decreasing. Through all the country east of the narrow belt of stationary variation the easterly variation is decreasing. Los Angeles is in the belt of no change, with a bare possibility that the maximum limit has been passed.

A tabular statement of the variation in the vicinity of San Francisco brings up the variation from the mean of one hundred and twenty-two Spanish observations reduced to the mean epoch 1783.3; then we have the observations of Vancouver, Kotzebue, Beechey, Erman, Belcher, Ringgold, Davidson and other officers of the Coast Survey. All these observations have been plotted on a curve exhibiting the value of the declination at different epochs, and, as the report says, the observations since 1852 are so consistent that they "look like pearls on a string."

The systematic observation of the magnetic elements was begun on this coast in 1850 by Prof. Davidson, and when in 1870 the series was renewed and it became evident that the epoch of the maximum variation was approaching, a thorough and exhaustive series of observations was commenced. In 1867 and 1869 Davidson's observation showed that the maximum had been passed at Sitka, and in 1870 that at Victoria, B. C., the maximum had been very nearly reached. It reached its extreme range at Port Townsend in 1872.

In 1873 Elmbeck observed the variation along the coast of Lower California. Capt. Nichols of the Navy, on the Coast Survey steamer Hassler, in the year 1881, carried a line of magnetic observations to Cape San Lucas, to the islands off the coast of Lower California and off the Gulf of California and up the Gulf of California. In 1882 he made a similar series

of observations from San Francisco to Alaska. In 1881 Capt. Lawson of the Coast Survey carried a line of magnetic observations from San Francisco through Oregon, Washington and Idaho. In 1882 and 1884 Davidson observed at stations from San Francisco to the City of Mexico, where regular observations are maintained by the Government.

Since 1871, the series at the astronomical station Presidio, commenced in 1852, has been continuous with only one break, and during the approaching maximum the observations will be made during two periods in each year.

The following example shows the reliable character of the instruments used and the methods of observation:

1884, Sept. 5-16: easterly variation..... 16° 32.3  
1885, August 4-18: " " " " " " 16 33.4  
1886, April 21-24: " " " " " " 16 33.1  
1887, Nov. 15-19: " " " " " " 16 33.9

The observers were Davidson, Marr and Morse. Each result is the mean of from four to ten daily determinations from the maximum and minimum of each day.

A continued series of observations at any given station demonstrates that the hourly variation during the day amounts to as much as ten minutes of arc; and that there are days when "magnetic disturbances" occur, giving a mean daily range of four or five minutes of arc on either side from the average. It is therefore evident that when an hourly change of ten minutes occurs during the day, the difference at the end of a line one mile long will amount to 15 feet if measured at the maximum and minimum readings of the needle.

The value of the Presidio series of observations for the determination of the epoch of the maximum variation, lies in the fact that they have been made at one station, and that no disturbing influences such as buildings with masses of iron have affected the measures; moreover, the astronomical hearings to the point of reference have been definitely observed.

The practical value of the whole series of observations given is readily appreciated by those who have been called upon to decide the hearings of boundaries of land wherein the compass bearing is given, but no record is exhibited to demonstrate the variation of the needle at the specified time. The table herewith presented has a worth beyond the dates of the tabulated observations, because from their discussion it is practical to derive a formula by which the variation at any proposed date can be safely computed.

From the Superintendent's annual report we reproduce the table of observed and computed magnetic variations at San Francisco.

TABLE OF THE COMPARISON OF THE OBSERVED AND THE COMPUTED MAGNETIC DECLINATION AT SAN FRANCISCO FROM 1783 TO THE PRESENT TIME.

DATE.	Observed Magnetic Variation.	Computed Magnetic Variation.	Diffs. (O-C)
1783.3	E. 12° 54' 6"	E. 12° 48' 0"	-06' 6"
1792.9	12 48.0	13 13.8	+25.8
1818.7	15 00.0	14 28.2	-31.8
1837.5	15 27.0	14 53.4	-33.6
1859.9	14 55.2	14 59.4	+04.2
1830.5	14 51.0	15 01.2	+10.2
1837.5	15 10.2	15 18.6	+08.4
1839.5	15 19.8	15 24.0	+04.2
1841.9	15 30.0	15 30.0	00.0
1850.0	15 40.8	15 48.0	+07.2
1852.3	15 28.8	15 52.2	+23.4
1858.4	15 52.8	16 03.6	+10.8
1860.6	16 25.2	16 16.2	-09.0
1871.9	16 22.8	16 23.4	+00.6
1872.8	16 25.8	16 24.0	-01.8
1873.7	16 24.6	16 25.0	+00.6
1874.0	16 27.0	16 25.8	-01.2
1879.2	16 31.2	16 30.0	-01.2
1880.8	16 33.6	16 31.2	-02.4
1881.5	16 28.8	16 31.8	+03.0
1883.4	16 38.4	16 32.4	-06.0
1884.7	16 32.4	16 33.6	+01.2
1885.6	16 33.6	16 33.6	00.0
1886.3	16 33.0	16 34.2	+01.2
1887.9	16 34.2	16 34.8	+00.6

This table shows what the observed magnetic variation was at the given date, and the computed declination shows what was the most probably true declination at the same date under normal conditions. As the observations themselves are subject to many known and unknown sources of error, the computed measures should be adopted. If the date required is not given in the table, the variation can be computed by the formula which Mr. Schott has derived from the discussion.

For San Francisco this formula is:  
 $D = -12.94 + 2.65 \sin (1.05m - 135^\circ.5)$ ,  
 where  $D$  is the easterly magnetic variation, and is reckoned with a minus sign;  $m$  stands for  $(t - 1850.0)$ , or the difference in time expressed in years and fractions of a year for any time, " $t$ ," and the middle of the century, within the range of observations at any station.



If, for example, it be required to know the magnetic variation at San Francisco for the end of June, 1867, it will be found 16° 18' easterly.

For computing the magnetic variation at 26 other places on this coast, along the coast of Alaska, on the Mexican Coast, and at the cities of Mexico, Vera Cruz, rules of similar form are given in a special table.

Upon the Pacific Coast the magnetic variations of the old Spanish navigators are wanting in their narratives up to the period of Bodega and his confreres, 1774-1779. Cahrillo, Ferrel and Vizcaino never refer to it, and yet they must have observed it. Although Drake was more than five weeks in Drake's bay, the narrative of Parson Fletcher never refers to it. An observation at that date would have been of inestimable value.

In the Arca del Mare, 1647, the variation is given on two charts, all the way from Aqua Pulca (Acapulco) to Cape Mendocino, but the positions are very doubtful.

The earliest record of apparently trustworthy magnetic variation is found in an "Historical Journal to the North of California in 1768, 1769, 1770, published by Dalrymple in 1790." This volume, which is in the possession of Robert A. Thompson, U. S. Appraiser, contains the journal of M. Sauvage le Muet, officer in the ship Comtesse de Pontchartrain, 1714, wherein he describes his landfalls, etc., from the Island of Guadalupe off the coast of Lower California to the Bay of Bandera in latitude 20° 40' just north of Cape Corrientes on the Mexican coast. In this brief journal Prof. Davidson has found that nine determinations of the magnetic variation are given at as many places whose geographical positions he has deduced from the modern charts.

These observations are quite systematic and indicate a good observer. At Bandera bay the fact is especially noted, "no variation." This fixes the agonic line at the place in 1714, and Mr. Schott reports that it is a very interesting record so fortunately recovered.

Curiously enough, we are not enabled to join by an easy sweep the two agonic of the Atlantic and Pacific Coasts of that period. The agonic of 1700 on the Atlantic side crossed the coast line in a nearly east and west direction through the northeastern part of North Carolina. This shows the independence of the Pacific agonic line then as now.

The importance of the Pacific agonic of 1714 upon the length of the magnetic period is self-evident. As an incidental fact it shows that the change of the variation has been nine degrees to the present time.

Within the last month Prof. Davidson has had several applications from engineers and surveyors for the value of the variation at given epochs, when old surveys were made.

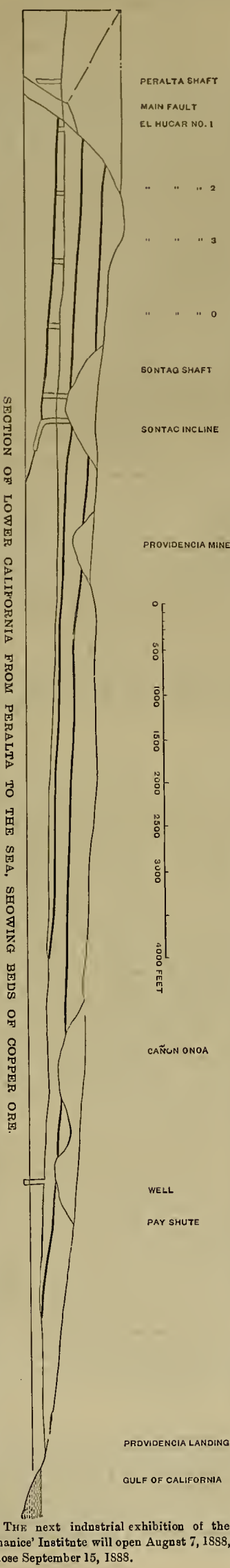
**Mining Debris Bill.**

Following is the full text of the bill introduced in the House of Representatives by Congressman Biggs, for the investigation of the mining debris question in this State:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of War is hereby authorized and directed to detail three officers from the Engineer Corps of the United States Army as a Commission, for the purpose of making a thorough examination and investigation of the mining debris question in the State of California, and for a complete examination and survey of the injured river channels, its tributaries, and the land adjacent thereto, with a view to their improvement, and to devise some plan whereby the conflict between the farming and mining section may be adjusted. And that the sum of \$10,000, or so much thereof as may be necessary, is hereby appropriated out of any money in the Treasury not otherwise appropriated, for the purpose of carrying into effect the provisions of this Act; the said sum to be expended at discretion of the Secretary of War; the said Commission to report as early as practicable to the Secretary of War the result of their investigation.

**SURVEYING WORK.**—Colonel Fred Crocker says the Southern Pacific has had, until within a few weeks, over 40 different parties of surveyors at work in various sections of the State, and that they now have maps, profiles and located lines in every district where there is the slightest prospect for a railroad line.

The first oil steamer with iron tanks to convey the product of the Ventura oil wells in bulk was launched this week from Alexander Hays' shipyard.



The Lower California Copper District.

Among the prominent copper mines of this coast are those on the property purchased by a French syndicate in Lower California. A description of these mines was furnished by D. W. Brunton to A. F. Wendt for his paper on the "Copper Ores of the Southwest." The location of these mines is in the municipality of Moleje, in Lower California, Mexico, and across the Gulf of California, 90 miles distant from Guaymas.

Copper was first discovered in the district in the spring of 1863 by Jose Rosa Billaviconico, a fruit-packer, who was looking for a short trail from Santa Agueda ranch to Santa Maria port. The mines were first opened in 1871. They cover a territory some six or seven miles in length along the coast, and extending parallel therewith and into the peninsula, a distance of three or four miles. The entire strip of country may be considered an elevated plain rising toward the interior. The plain is cut by numerous canyons and ravines, which empty into the gulf. The ore occurs in three beds with intervening rock, and the ore beds and the whole country dip at a slight angle toward the shore of the gulf. The two accompanying sections are self-explanatory. The heavy, black lines in the long section indicate beds of copper ore.

The rock in which the ore is found is evidently of very recent origin, and overlies an undulating bed of trachyte of unknown depth. While the ore beds extend over a very large territory, the valuable portions cover a comparatively limited area, and the pay ore occurs in chutes or chimneys in the beds, having a width of 75 to 150 feet, and a general northwest and southeast course. The ores differ very widely in composition and appearance; in fact, a great many of the ores have not the characteristic appearance of ore at all, but look like yellow clay. True copper ores varying from copper glance to green and blue carbonates, do, however, occur. Malachite forms the bulk of the ore; and wad or superiferous oxide of manganese occurs in the next largest quantity. All the work done on these mines has been by shallow shafts or adits from the surface. The thickness of the ore beds varies considerably, from a mere seam to three feet.

Yaqui Indians are almost exclusively employed; and until the transfer of the property to the French syndicate, all the ore was mined, sorted up to about 20 per cent, and shipped to Europe. Since the property changed hands a 42-inch water-jacket furnace has been erected and run on the ores of the property; and at present 20 miles of narrow-gauge railway has been built, and three large square water-jacket furnaces, of the Raschette type, and measuring 42x90 inches at the tuyeres, have been erected. The cost of smelting, with English coke laid down on the shore of the gulf at less than one-half of its cost to any other smelting works in the Southwest, and the cost of mining labor, with miners at only \$1 per day, being so extremely low, a large output is expected from these mines for some time.

Hyperbole in Mining Reports.

It is astonishing the extent to which the human judgment is apt to be warped by either interest or prejudice. The bias imparted to our thoughts and feelings by sheer prejudice finds apt illustration in the politics of this, and perhaps of every country, these being everywhere largely the result of early impressions and education. In like manner self-interest determines to a great extent the opinions entertained by men in regard to the ordinary affairs of life. Seen through this medium, the mental vision suffers the strangest obliquity.

We have been led to this train of reflection from observing how much newspaper writers in the mineral regions seem sometimes influenced when commenting on the merits of experts sent to examine and report on mining properties in their neighborhood by the character of such reports. If these reports be favorable, the local press sees much in the mine-viewer to approve and praise. He is spoken of as the "well-known expert," the "distinguished professor," the "celebrated mining engineer," etc., just as the metropolitan press is wont to beslobber with undue praise the notable prize-fighter, horse-jockey, or man who performs some great feat at base-ball or billiards.

But let the mine-inspector's report be unfavorable; let him presume to condemn the property he has been sent to examine, or speak lightly of the district generally, and very different is the treatment he receives at the hand of the local scribe, who is then pleased to doubt the man's fitness for a service of this kind. He has heard damaging rumors about him—things not at all to his credit—the fellow, so far as can be learned, having altogether an unenviable record. Paraphrasing somewhat the language of the mountain editor on such occasion, it may run slightly like this: "Expert! forsooth! What can this person know about mines? We gravely doubt his ever having seen one before; he may have seen the inside of a penal institution, but of a mine never until now. We wager he comes here in the interest of some wily capitalist, who, through this mendacious report, hopes to give our mines a black eye, and so get hold of them for a song! Was ever baser scheme concocted than this? But it shall not avail these mercenary parties, neither principal nor hireling. If they hope to depreciate the value of the 'Lunar Rainbow' or other of our sterling properties by such shallow device, disappointment awaits them. The honest, intelligent denizens of 'Wild Goose Flat' will see to it that such flagrant attempt at robbery react on their own heads. Far be it from us to incite to violence or indulge in unseemly language; but we strongly advise, should another of these unmitigated frauds and immeasurable liars be found prowling about 'Wild Goose' that he be incontinently jerked and rode on a rail. This is an orderly and law-abiding community, but we can see no good reason why a knave like this, coming here to report adversely on our mines, should not be treated to a coat of tar and feathers. In most camps the miscreant would be strung up to a tree, and a period put to his worthless existence.

"The *Miners' Protector and Clarion of Freedom* is a conservative journal, slow to resent wrong and temperate of speech; and ours, as above remarked, is a peace-loving and patient community. They shrink from the very thought of bloodshed, and even regard the slightest infraction of the law with abhorrence. Still, it seems to us, in view of what has lately transpired, that a shot-gun brigade should at once be organized for the purpose of protecting the mining interests of 'Wild Goose' against this new danger."

That our mountain contemporaries and their constituents have sometimes had good reason to complain of the reports made by these mining experts is undoubtedly true, but it should be remembered that the injury thence arising has been measurably repaired by the oft-time too laudatory reports emanating from this same class of professionals, a consideration that ought to mollify their resentment toward the offenders. That these reports should err in neither direction is, of course, desirable, since gross exaggeration can in the end be only hurtful to all concerned.

DURING the past week 340½ tons of Chollar ore were milled which averaged \$38.48 per ton.

The next industrial exhibition of the Mechanics' Institute will open August 7, 1888, and close September 15, 1888.



## MECHANICAL PROGRESS.

## Rails One-Quarter of a Mile in Length.

The rapid progress which is being made in the practical application of electricity is one of the marvels even of this progressive age. We made mention in these columns a few weeks ago of the successful application of electricity to the welding of iron. We have now to notice the application of this invention to welding railway iron, *in situ*. By this device a large number of rails are joined together as they are placed upon the track so as to make a continuous rail of any desirable length, thereby avoiding the pounding always incident at the end junction of the rails as ordinarily laid, a matter greatly to the discomfort of the passengers, and one which causes much wear and damage to the rolling-stock.

The inventor is Mr. Elias E. Ries, a well-known Baltimore electrician, and consists of appliances by which this work may be conveniently and rapidly performed. By this device the ends of the rails are welded by means of a transformed electric current of large volume of heating capacity, and afterward tempered so as to bring the joint to correspond in hardness to the remaining portion of the rails. The entire welding apparatus is contained on the pilot or construction car, and the time occupied in forming a joint is estimated to be less than half a minute. The expansion joints are placed at intervals of one-fourth of a mile, the rails being securely fastened at their center and expanding in both directions, so that the variations produced in a length of one-eighth of a mile only require to be compensated for. On a double-track street or steam railway having 30-foot rails, there are 704 joints to the mile, each of which gives quite a perceptible shock every time it is traversed by the wheel. With the expansion joints these shocks are said to be obviated, and counting four to the mile of single rail, 688 joints out of the 704 are dispensed with. The importance of this invention in the matter of welding rails alone can be readily understood, if practice bears out the results that are promised by it.

**HEAVIER RAILS AND LOCOMOTIVES.—**ENGLISH VS. AMERICAN.—The Pennsylvania Railroad Company is about to institute a series of crucial experiments for comparing the heavy English rail with the lighter American. In the experiments, wherever the English rails are put down, the roadbed will also be made to correspond to the English system. The experiments will be made by laying half-mile sections alternately with the different rails over two miles extent of road. On the New York division the rails will be laid between Menlo Park and Metuchen; on the Philadelphia division, between Lemon Place and Kintzer's; on the Middle division, one mile east of Huntingdon, and on the Pittsburg division the rails will be put down on the eastern slope of the Alleghenies, near Alleghippas. The new rail will weigh 90 pounds to the yard, and they are to be tested for ten years. The company has also ordered an English engine of the usual type for comparison with the American locomotive. The days of light railroading are evidently fast going out. On many of the new lines, heavy rails, heavy engines, heavy cars, heavy coaches and heavy trains are already the order. The old roads are making their renewals with heavier materials of all kinds. Freight trains of ten years ago would be as pigmies by comparison with those of to-day.

**WORKING METALS BY ELECTRIC POWER.**—The Dresdoer bank is stated to have acquired the right of working the German patents for the invention of MM. N. de Benardos and St. Olszewski of St. Petersburg, while the firm of Rothschild of Paris has acquired the exclusive right of working the patents for France, Belgium, Spain, Italy and Austria. The invention referred to relates to a method of working metals by the direct application of an electric current, and more especially of forming alloys by the same means. The results obtained are stated to be most remarkable, it being an easy thing to intimately commingle all manner of metals, even those least fusible, without the admixture of any substance save solder, and to effect this not only between homogeneous, but also heterogeneous metals, alloying, e. g., copper with both wrought and cast iron, nickel with iron, lead with iron, aluminium with platinum, etc. Among professional metallurgists we are told that much importance is attached to this invention, and the preliminary trials that have taken place at St. Petersburg and at Creil, near Paris, having turned out most successful, several French and Russian metallurgists are stated to have applied for licenses to work the system on a commercial scale.

**A NEW PROCESS** for producing iron and steel direct from the ore has been invented and patented by a Russian engineer, which, a British consular report says, will create a revolution in the manufacture of charcoal iron. Under the new process iron ore, after being submitted to the ordinary smelting process, is taken direct from the furnace to the rolling-mill and turned into thin sheets of the finest charcoal iron.

**IRON AND STEEL FOR WOOD.**—It appears that special attention is being paid in France and England to a more general substitution of iron and steel for wood, wherever practicable, in manufactured articles, as, for instance, building materials, boxes and packing-cases, barrels or casks, carriages, carts and other vehicles, furniture, fencing, railway-work, sheds, signal-boxes, telegraph poles, etc. In France there have recently come into use hollow iron-window frames and doors, which are said to be light and strong and of far greater durability than could ever be assumed of wood. There is no reason, too, it is thought, why corrugated barrels of iron and steel should not be used for liquors, since milk and preserved fruit and other articles are kept in cans. Steel is finding much favor among carriage-builders, but there is still much prejudice against the metal being used in the manufacture of furniture. The general adoption of steel sleepers is warmly advocated by some, as is also the employment of iron and steel in the construction of railway cars, and the erection of wooden sheds, signal-boxes, etc., by railway companies, as at present, might, it is urged, be profitably and economically substituted with steel. Corrugated sheet-iron casks are already being used in Germany to transport liquids which expand by heat. They stand an internal pressure of 30 pounds to the square inch, and are a great saving.

**THE SWINERTON LOCOMOTIVE.**—A locomotive possessing several unusual features has been recently built by the Hinkley Locomotive Company of Boston, for the Swinerton Locomotive Driving Wheel Company. The engine is designed to run fast passenger trains, and has a single pair of drivers, 67 inches diameter on tread, and a pair of 42-inch trailing wheels with radial motion. The front end of the engine is carried on a four-wheel truck, as usual. The engine has piston valves, but the most novel feature is the form of the tread of the driving wheels. The circumference of the tire, instead of being a true circle, is polygonal, and formed of 105 flats, each about two inches long. The object is to prevent slipping. The engine has not yet been tried, but it is claimed that polygonal tires have been running on a four-coupled engine on the Boston & Lowell road during the last year with satisfactory results. A flat wheel is generally regarded as damaging to the rails, while the motion of an engine or car with flat wheels is exceedingly unpleasant. Whether any extra adhesion will be gained seems doubtful, but even this means of preventing slipping would certainly, according to all preconceived notions, be more objectionable than the use of sand.

**IMPROVEMENT IN THE MANUFACTURE OF TIN CANS.**—An ingenious and useful improvement in the manufacture of tin cans for preserving food is being introduced, the plan consisting simply in so forming the lid that it is merely pressed on, and the can is hermetically sealed so that no internal pressure can remove the lid. Water boiled in a tin thus closed has failed to force it off, although the steam pressure has burst the can itself. A penny piece, however, used as a lever by being placed under a rim formed around the top of the cover, with the shoulder of the can as a fulcrum, raises the lid with a remarkably small expenditure of power. The principle involved in the device is that of the wedge and lever. The neck of the tin on which the lid fits is formed at a very slight angle from the vertical, and the rim of the lid is made at a corresponding angle, no colder being used to form the joint. By means of this arrangement, therefore, the opening of cans is rendered a remarkably clean, quick and simple operation, contrasting greatly in these respects with the inconvenient method of opening now in vogue.

**PRICE OF IRON IN 1773.**—In 1773 Baltimore people were served with the *Maryland Journal and Baltimore Advertiser*, a folio issue, 12 by 14 inches. Beside an advertisement from George Washington, reciting that he had patents for 20,000 acres of land on the Ohio and Great Kanawha, it contains a market report of August 22d of the year named, from which it is learned that flour sold for from \$5 to \$5.25 per barrel, bar iron for \$130 per ton, and pig iron for \$40 a ton.

**HOT WATER AND LEAD.**—Lead in contact with steam, under a pressure of 10 pounds per square inch, very soon loses its strength, and it is therefore good neither for packing joints nor for conveying steam. When thus used for the latter purpose, the lead, if not kept on a continuous support, will lengthen and sag, until from thinness it entirely gives way and bursts.

**A CHEAP STEAM PUMP.**—A complete steam pump for \$7 is now offered and meeting with successful sale by Messrs. Van Duzen & Tift of Cincinnati. This is a surprising innovation in the line of trade in the matter of cost. Send to them for catalogue for prices of the various sizes and designs.

**IRON ARTICLES,** when forged, can be case-hardened by heating to bright red and sifting on the surface finely powdered praseite of potash. When cooled to a dull red, plunge into cold water.

**HARDENING CAST IRON.**—Cast iron may be hardened by heating to a bright red and simmering in pure lard oil.

## SCIENTIFIC PROGRESS.

## What Science Owes to Industry.

Far be it from me to depreciate the value of the gifts of science to practical life, or to cast a doubt upon the propriety of the course of action of those who follow science in the hope of finding wealth alongside truth, or even wealth alone, writes Prof. Huxley in *Popular Science Monthly*. Such a profession is as respectable as any other. And quite as little do I desire to ignore the fact that, if industry owes a heavy debt to science, it has largely repaid the loan by the important aid which it has, in its turn, rendered to the advancement of science. In considering the causes which hindered the progress of physical knowledge in the schools of Athens and of Alexandria, it has often struck me that where the Greeks did wonders was in just those branches of science, such as geometry, astronomy, and anatomy, which are susceptible of very considerable development without any, or any but the simplest, appliances. It is a curious speculation to think what would have become of modern physical science if glass and alcohol had not been easily obtainable, and if the gradual perfection of mechanical skill for industrial ends had not enabled investigators to obtain, at comparatively little cost, microscopes, telescopes, and all the exquisitely delicate apparatus for determining weight and measure, and for estimating the lapse of time with exactness, which they now command.

If science has rendered the colossal development of modern industry possible, beyond a doubt industry has done no less for modern physics and chemistry, and for a great deal of modern biology. And as the captains of industry have, at last, begun to be aware that the condition of success in that warfare, under the forms of peace, which is known as industrial competition, lies in the discipline of the troops and the use of arms of precision, just as much as it does in the warfare which is called war, their demand for that discipline, which is technical education, is reacting upon science in a manner which will, assuredly, stimulate its future growth to an incalculable extent. It has become obvious that the interests of science and of industry are identical; that science cannot make a step forward without, sooner or later, opening up new channels for industry; and, on the other hand, that every advance of industry facilitates those experimental investigations upon which the growth of science depends.

**THE GREAT TIDAL WAVE.**—The tidal wave, says Dana, differs from ordinary waves in many respects: In having an extra terrestrial origin—the attraction of the moon and sun—owing to which the ocean feels the impulse to its bottom, and the wave is a translation wave; in the movement being westward, in consequence of the earth's eastward revolution, and hence in having the same rate of movement as the earth, or 1000 miles an hour at the equator (that is, movement in wave motion, not in water), consequently in having for the length of a single wave 12,000 miles, the ebb and flow occupying together 12 hours. The Pacific is too narrow from east to west to contain at once much over half of the wave-curve, and the North Atlantic could hold transversely but a quarter of it. After leaving the Pacific its course is north-westerly in the Indian ocean, and the same also in the Atlantic. The height in the Middle Atlantic is very small, but as the depth diminishes on soundings the wave increases in elevation, and its translation character becomes more and more appreciable. Still, at the prominent headlands of the continent, its height is only one to two feet. Converging coast lines augment the tide's height, so that it becomes 5 feet at the entrance to New York bay, 7 feet at Savannah, 10 feet at Boston, and 40 to 70 feet in the narrow Bay of Fundy.

**A UNIQUE LAKE.**—In a little basin of the Alps, 7700 feet above the sea level and five miles from the end of the great Aletsch glacier, is the unique little lake known as the Marjalén sea. This is fed by mountain streamlets, its waters being held back by the ice of the great glacier itself. An English geologist mentions having seen it in 1853 as a body of water 300 yards wide and three times as long, with a maximum depth of 97 feet. But the next day it had vanished. The ice-dam had yielded efficiently to allow the pent-up water to escape beneath the glacier and plunge into the valley below, devastating the fields and considerably raising the level of the Rhone. These discharges take place at irregular intervals, though reputed to occur every seven years. The latest outbreak was in September last, since which it has been proposed to lessen future damages by providing an artificial outlet to reduce the lake's capacity one-half.

**COMPRESSIBILITY.**—At a recent meeting of the Edinburgh Royal Society, Prof. Tait communicated some results on the compressibility of water, of mercury and of glass. The average compressibility of a 20-per-cent aqueous solution of common salt per atmosphere for the first 100 atmospheres is 0.00000316. It diminishes rapidly with the percentage of salt in solution. The compressibility of common lead glass is 0.0000027 at a temperature of 19 degrees C.

## American Chemical Industry.

The *Engineering and Mining Journal* has published a series of articles on the above subject which is worthy of attentive consideration, and to which we propose to refer from time to time in these columns. In a general notice under this head the editor of the *Journal* recently said: For very nearly a century it has been customary in civilized countries to consider the production of alkali in the light of a criterion of national advancement; nor is this a matter for surprise when we remember that in all such important manufactures as soap, glass, candles, paper, sugar, starch, wood-pulp, pottery and earthen-ware, as well as in bleaching, dyeing, and oil-refining, the use of the compounds of soda, chlorine and lime are essential and primary factors. It is extremely melancholy to reflect that more than one-tenth of our requirements are furnished from home produce and that we have consequently no chemical industry; and to admit that if Dr. Wyatt's work were limited to a simple record of our own progress, a very few lines would suffice to tell the tale.

Now without entering into any one of those technicalities involved in this question, we may aptly point out that all the elements required in this industry are obtained from natural sources; that they comprise sulphur, coal, salt, limestone and nitrate of soda, and that without exception we possess the whole of them in absolute abundance. We, therefore, decline to believe in the necessity for paying some ten millions of dollars to England every year for what we ought to be making ourselves; and we attach no importance to various hackneyed and puerile excuses of dear land, dearth of material, scant capital and costly labor, which have hitherto been advanced in extenuation of our shortcoming and which probably only serve to cover the interest of a clique. The real root of the evil is undoubtedly a sheer and utter ignorance of the industry and all that pertains to its proper conduct; at this root we intend to strike, and we trust that in our efforts to destroy it we may receive cordial co-operation from all those who, like ourselves, are devoted to the progress of the United States in all the diversified elements of a stable industrial prosperity.

**A GREAT MAGNET.**—It is said that one of our leading army engineers has brought before the engineering classes of late an experiment of so startling a nature in its inception as to promise wonderful results. It is a monster magnet made of two Rodman guns, which are connected at the breech. Around the magnet thus formed is wound about 20 miles of submarine cable. The cable is some that has been used in the torpedo service. It is wound and fastened in a substantial manner, making a permanent magnet. When electricity is applied some strange results take place. For instance, a bar of railroad iron 30 feet long, if placed in the open cannon's mouth, cannot be drawn out by as many men as can grasp it. Another instance of the strength of this big magnet was illustrated recently with a 350-pound cannon-ball. The shot was placed in the mouth of the cannon on the negative side. On reversing the electrical current it fell from its position, but was attracted to the opposite cannon and clung to its side. The positive current was then reversed alternately with the negative, and the heavy cannon-ball played between the two cannon like a tack between the poles of a toy magnet. It is said that there will soon be a public exhibition of this remarkable magnet.

**DYNAMITE SHELLS.**—The projecting of dynamite shells by gunpowder instead of by compressed air, which seems to have been successfully accomplished, marks what bids fair to become an important era in the progress of such things. First Lieutenant Zalinski determines that such shells can be projected by air if great care is observed. Next Lieutenant Grayson has shown that such shells may be safely projected by gunpowder. This latter fact looks to most important possibilities in the future conduct of wars, and furnishes another strong reason to believe that the destructive weapons of modern warfare may soon be such as to render war but little else than wholesale massacres, from which no glory nor honor can be derived. When that time fully comes the occupation of great strategic generals will be gone, and there will be little opposition to a continental or world's congress in which all national disputes will be settled without recourse to arms.

**ELECTRICAL TRANSMISSION.**—Experiments have proven that elevation of the wires from the earth have much to do with the speed at which the electric current is transmitted. At a moderate height Prof. Gould has found that the wires transmit at the rate of 12,000 miles a second, but if the wires are suspended at a much greater height the rate is increased to 16,000 or over 24,000 miles a second. Subterranean wires and submarine cables transmit slowly.

**VIOLET AND INVISIBLE RAYS FOR FLOWERS.** Prof. Sachs, the great German botanist, has discovered that the ultra violet and invisible rays of the solar spectrum especially promote the development of flowers, the growth of which is exceedingly feeble when the rays are suppressed, although that of the other parts of the plant is very luxuriant.



## ENGINEERING NOTES.

## Steam vs. Sand for Increasing the Adhesion of Locomotives.

One of the questions submitted to railroad companies by the International Commission of the Congress of Railroads was as to the question of the use of a jet of water or steam to increase the adhesion of locomotive wheels. The companies have submitted answers to this question, which are published in the *Bulletin* of the commission. These answers have shown a decided decrease in expense, the expenditure for sand having been in one instance \$4000, while the cost of the subsequent use of steam or water jet for the same length of time was only \$500.

The further opinion is advanced that, while the adhesion is not increased quite so much by the use of water as of sand, the water-jet system has the advantage in that it does not interpose any resistance to the movement of the train, as does the sand, more or less of which remains on the rails. The engine-drivers much prefer the water-jet system, as they say it makes the train lighter—that is, it draws more easily. It is stated also that the abandonment of the use of sand is accompanied by a lessening of the wear of rails. This result is supported by numerous observations made upon different railroads. The report concludes that the results so far obtained justify the making of more extended experiments with the water-jet system.

**THE PRINCE EDWARD ISLAND SUB RAILWAY.**—The English company, at present building the London and Southwark subway, has submitted a tender to the Dominion Government to complete the subway under the Northumberland strait, dividing Prince Edward island from the mainland. The proposition is to take the Prince Edward Island railway off the hands of the Government and operate it; also to subsidize it \$200,000 per year for 50 years. Walter Stanley, C. E., has already favorably expressed his opinion as to the feasibility of the scheme of traveling under the strait. The Government holds that a great advantage will be obtained from this new scheme, in making a direct line to the seaboard by running trains over the Short Line railway through Main, and utilizing the subway and the Prince Edward Island railroad to Georgetown, thereby making a saving of 372 miles of water passage, and 24 hours of time in a passage from Montreal to Liverpool.

**THE NEW BALTIC CANAL.**—By means of a new canal, water communication between the Caspian and the Baltic has been greatly improved. This canal joins the rivers Wyegra and Kovja, and forms a fresh link in the chain of water-ways known as the Maryinsky system, connecting the Neva with the Volga. Some of the cuttings through which it runs had to be excavated to the depth of 30 feet; and most of the work was done by hand, upward of 20,000 laborers having been employed in carrying through the undertaking, together with several of the most effective dredging machines. Compared with the rest of the vast canal system between the Neva and the Volga, the new link, though not so formidable or extensive as some others, derives its importance from its relieving the pressure of traffic on the other canals and shortening the distance between Kybinsk and St. Petersburg.

**COMPRESSED AIR INSTEAD OF STEAM.**—Considerable attention is being given to the introduction of compressed air instead of steam as a motive-power both in this country and in Europe. A company in Birmingham, England, are completing a large central plant for furnishing compressed air through mains to the owners of small engines. Trials already made are said to have shown that the cost to consumers will be considerably less than the cost of steam made on the premises. Besides doing away with the dirt and dust from the coal, and the saving of room, the use of compressed air is said to furnish excellent means of ventilation. A valuable feature of the charter of this company is a clause compelling them to divide all profits over 10 per cent with the consumers.

**ELECTRIC RAILWAYS.**—It will surprise many to learn that there are now running in this country 11 electric railways, equipped with 68 motors and motor cars. It is estimated that they are now carrying at the rate of 3½ million passengers a year, and when the roads now under contract are completed, twice that number will be carried. It is undoubtedly a fact that considerable progress is being made in this country in the use of electric motors, both for tramways and for furnishing small power in factories. There has been a superabundance of smoke about the matter of making and introducing electric motors and engines, and we are glad that there has been some fire.

**THE NICARAGUA CANAL.**—Engineer Menocal of the Nicaragua Canal Company is making arrangements to send out eight engineering parties to locate the canal. He expects the work of excavation will begin not later than July 1st. A syndicate of New York, Baltimore and Richmond gentlemen have the matter in charge. The total cost is estimated at \$65,000,000.

## USEFUL INFORMATION.

## The Temple at Jerusalem.

The great glory of Jerusalem was the Temple, a monument rather of wealth than of artistic skill. Like all Solomon's buildings, it was designed by a Phœnician architect; and the skilled workmen who carved the wood and stone, and wrought the gold, and founded the brass, were citizens of Tyre and Sidon, only the rough labor being provided by the hundred and fifty-three thousand Canaanite settlers who were drafted off to the forests of Lebanon to hew timber, and to the port of Joppa to carry the materials from the seaboard to Jerusalem.

Of the architecture of the Temple we know little except its proportions, and that, like most temples of antiquity, it was divided into three courts, called, in this case, the porch, the holy place, and the holy of holies. It was extremely small, measuring only 35 feet in width, while the total length was only 105 feet; so that its impressiveness depended on its golden walls and pillars, floor and ceiling, its precious jewels, and the richness of the embroidered hangings that curtained off the sanctuary. And mingled with all this gold we read of brass, a compound that seems to have been scarcely less esteemed in those days, when the tin mines of Spain and Cornwall were among the recent discoveries of the Phœnicians, and the brass made at Tyre from the tin of Tarshish or Spain, and the copper from Cyprus was still a rare article, commanding a very high price.

The cost of this golden Temple was defrayed by the moneys left by David and by the offerings of the people; but heavy taxes were levied to create funds for the palaces, towns, and fortresses that arose in such ruinously rapid succession. No exchequer could long endure such a drain, no nation support so vast and sumptuous a court without murmuring; and though we do not know what was the relative value of gold and of the commodities of life, the stress laid upon the fact that all the vessels in the palaces were of gold, points to the conclusion that this provision was as sumptuous in those days as it would be in our own.

## How to Prepare Calcimine.

Soak one pound of white glue over night; then dissolve it in boiling water and add 20 pounds of Paris white, diluting with water until the mixture is of the consistency of rich milk. To this any tint can be given that is desired.

**Lilac.**—Add to the calcimine two parts of Prussian blue and one of vermilion, stirring thoroughly, and taking care to avoid too high a color.

**Gray.**—Raw umber, with a trifling amount of lampblack.

**Rose.**—Three parts of vermilion and one of red lead, added in very small quantities, until a delicate shade is produced.

**Lavender.**—Make a light blue and tint it slightly with vermilion.

**Straw.**—Chrome yellow, with a touch of Spanish brown.

**Buff.**—Two parts spruce, or Indian yellow, and one part burnt sienna.

## WHY SNOW DESTROYS MARBLE STATUARY.

—The results of the examination of snow taken from different places in Munich and its neighborhood by Mr. Sendtner, says the *Pharmaceutical Journal* (London), would seem to indicate not only that snow has a considerable faculty for absorbing sulphurous acid from the atmosphere, but that the absorption goes on continuously for some time. Mr. Sendtner ascertained that, on one day, when snow fell, sulphurous and sulphuric acids were present in it in fairly equal proportions, but on the second day, almost all the sulphurous acid had been oxidized to sulphuric acid. In the vicinity of chimneys and gas works the absorption would, of course, be greater. This great absorption power toward sulphurous and sulphuric acids is considered of great practical interest as explaining the destructive influence of snow upon marble statuary.

**COAL AND IRON** are generally found in close proximity; but it is seldom, if ever, we have noticed so close a juxtaposition as is stated in the following item from a Southern paper: "A person can stand on the postoffice roof in Birmingham, Ala., and shoot a pistol bullet into a mountain of coal on one side and a mountain of iron on the other. The limestone required to flux the iron lies in the narrow valley beneath."

**RESIN** is frequently used for producing an immediate adhesion of the belt to the pulley, and for this it is well suited, but if the owner has any regard for the consequences he will soon learn that while the resin will give an instant grip to the slipping belt, it will soon he ground into the leather, stiffen the material and make the last state of that belt worse than its first.

**WARM WATER FOR CATTLE.**—The *Silver State* says it has been proved by actual experiment that cattle can be fattened at Golconda, where they have water at a temperature of 75° to drink in winter, in one-half the time and with less feed than where they have to drink ice-water.

**COAL OIL VS. WHALE OIL.**—Whales were destroyed to such an extent before coal oil was

discovered that they seemed destined to be utterly destroyed in all of the seas and waters on the globe where they were found. They were captured for whalebombs as well as oil. Cheap coal oil has caused a great increase in the whales in all of the old whaling-grounds. Coal oil has run whale oil out of the market.

**A DOG'S SCENT.**—An investigator has discovered that, although dogs can follow a man's trail even after strong perfumes have been sprinkled along the track, yet if sheets of tissue paper are placed on the ground to be walked over and afterward removed, no trace of the scent will lie.

**STEALING ELECTRICITY FROM THE TELEPHONE.**—A jeweler at Lowell, Mass., has demonstrated his originality by stealing electricity from his telephone and using it to run light machinery.

**GUNPOWDER** and cannon were first used in warfare at the siege of Constantinople in 1453.

**A SNAIL'S PACE** is a mile in 14 days.

## GOOD HEALTH.

## A Scientific Cataract.

The blindness of the old-school medical profession to modern progress is due to what may be called a cataract formed by medical bigotry. It will require half a century to remove this cataract. We are reminded of its existence by a paragraph in the *Boston Herald* speaking of the cancer in the throat of the Crown Prince of Germany, which the faculty expect to prove fatal, which it calls "a physical disorder for which medical science has yet to discover a remedy. It is not at all likely that this fortunate discovery will occur soon enough to be of service to the heir-apparent." This flat denial of the curability of cancer is in the same columns in which an enlightened correspondent gave ample proof of cures with names and dates. Such denials are published in a city where a diligent inquiry would reveal large numbers of successful and well-attested cures of cancer. But, alas! says an exchange, these cures were not made under the authority or by the disciplined followers of the old-school American Medical Association, and therefore they cannot be recognized or heard of. There is an affected dignity among the medical profession which cannot see or feel anything it does not wish to see or feel, which reminds us of a story of two ladies. Said Madam E., a Swiss lady, to Madam R., a French woman, "I was surprised to see you walking with Col. M. yesterday. Do you not know that he was publicly horse-whipped by Capt. D. of the Infantry?" "I do not mind such remarks at all," said Madam R. "for I know that Col. M. is a man of honor and too dignified a gentleman to notice anything going on behind his back."

Speaking of cancer, the press and the political world are greatly concerned at the probable fate of the Crown Prince of Germany, attacked with cancer in the larynx, and with little or no hope of surviving. They announce as the result of the great scientific investigation prompted by this fact, a "great discovery concerning cancer." Is it the discovery of a cure? Oh no; they think they have discovered the *cancer bacillus*. That is science, but as for destroying the cancer bacillus they leave that to the physicians whom they call quacks for curing what the professors cannot cure.

We condense the above from the *Journal of Man*, an ably conducted magazine, recently established in Boston. The facts detailed so closely compared with a similar class of facts existing in this city that we bespeak for them a careful perusal. Our readers are quite familiar with the "Cancer Discussion" in these columns. That discussion has by no means been given up. The practitioner to which so many allusions have been made is still making a successful progress in her work—further note of which will soon be made in these columns. In the meantime, the "faculty" are as denunciatory as ever of the practitioners, but no one has yet denied any of the instances of "cure" which we have given. The most they do is to say the physicians have been mistaken in their diagnoses—that if the patients have been cured that fact is evidence that such instances were no cases of cancer! Could folly and prejudice go further? Their vision is completely obscured by "a scientific cataract."

**THE DEATH-RATE.**—Modern sanitary improvements, says Sir Spencer Wells in a late address before a medical society in Nottingham, England, have reduced the annual death-rate from 29 in a thousand to 19. He further said that it ought to be reduced to 15 or 12. He then said: "And if we have—as we really have—seen the average duration of human life in Great Britain advance from 30 years (which it was half a century ago—to 49 years (which it is now, according to life tables), why may we not witness a still further advance? Why should 70 or 80 years remain as the usual limit of human life? Why should its natural duration under perfectly healthy surrounding conditions not be at least 100 years, with an occasional extension of some 10 or 15 years more."

## How to Keep Warm and Avoid Colds.

Some people may not know that when exposed to a severe cold a feeling of warmth is really created by repeatedly filling the lungs to their utmost in this manner. Throw the shoulders well back and hold the head well up. Inflate the lungs slowly, the air entering entirely through the nose. When the lungs are completely filled, hold the breath for ten seconds or longer, and then expire it quickly through the mouth. After repeating this exercise while one is "chilly," a feeling of warmth will be felt over the entire body, and even to the feet and hands. It is important for all to practice this exercise many times each day, and especially when in the open air. If the habit ever becomes universal, then consumption and many other diseases will rarely, if ever, be heard of. Not only while practicing the "breathing exercise" must the clothing be loose over the chest, but beginners will do well to remember, in having their clothing fitted, to allow for the permanent expansion of one, two and even three inches, which will eventually follow.

One might with propriety say that too many people choke or stifle the skin by an excess of clothing, and, as a consequence, take cold easily. Some impurities are thrown out of the system by the skin, as others are by the lungs, the bowels and the kidneys. It is absolutely essential to health that the emanations from the skin pass easily through the clothing. This—which is called "transpiration"—may be interfered with by an excess of clothing, or by clothing of a very close texture. All who wear india-rubber coats know how uncomfortable they cause them to feel after they have been on a short time. On the accession of Leo X to the papacy, there was a grand procession at Florence in his honor. A little girl was made to personate the golden age by being coated, from head to foot, with gold leaf. Before the day was over she died in convulsions, killed because "transpiration," or, in other words, because carbonic acid gas and dead, worn-out matter, which should have been thrown out by her skin, was shut up in her system by the metallic covering. Ordinary clothing will not, of course, prevent transpiration, but an excess will interfere with it; and when too much clothing is worn the same soon becomes foul, unless the outside air can freely mingle with the gases from the body and so dilute them. Some wear the thickest and heaviest under-vests which they can buy, and such people are very generally the victims of frequent colds. Following the rule of light clothing, they would be much safer from the dangers of exposure were they to wear two light under-vests instead of one very thick and heavy.—*Lx.*

**QUININE.**—This famous drug, which was once as high as \$5 an ounce, has become very cheap by preserving the trees which were formerly destroyed in gathering "Peruvian bark." The drug may now be purchased in quantities at half a dollar an ounce. The trees now yield a crop of bark every year. The fashionable sulphate of quinine, which is most extensively used, I consider the most objectionable form of the drug. My favorite form is the dextro-quinine, made by Keasby & Matteson, Philadelphia. But quinine is not at all a necessity. It could be satisfactorily replaced by Declat's syrup of phenic acid, a French preparation, which is free from the objectionable qualities of quinine. But even that is not necessary, for we have in the willow, the dogwood and the apple tree three American barks which might well replace Peruvian bark by their fluid extracts and alkaloids. To these we may add guaiacum (or life everlasting), an admirable remedy in fever, and other medicines and combinations of value. Our slavish dependence on Peruvian bark has been due to our ignorance.—*Exchange.*

**TEA-POISONING.** It is claimed, hides fair to become chronic. Dr. Bullard gives in the *Boston Medical and Surgical Journal* the details of 74 cases of chronic tea intoxication investigated by him. His conclusions are that the action of tea is cumulative; its action is more pronounced on the young and on those subject to anemia or physically depressed, although persons otherwise healthy occasionally show toxic symptoms; the average amount of the beverage required to produce poisonous effects in persons accustomed to its general use is a little less than five cups per day. Chronic tea-poisoning, Dr. Bullard asserts, is a common affection, its symptoms being usually loss of appetite, dyspepsia, palpitation, headache, vomiting and nausea, and nervousness, combined with various forms of functional nerve affections, such as neuralgia, hysteria, etc. Besides these, constipation and pain in the left side are frequent.

**LEMONS AND FELONS.**—Those of our readers who may have been annoyed with a felon cannot fail to have a painful recollection of the unpleasantness usually accompanying a disturbance of this nature. When a felon first begins to make its appearance, take a lemon, cut off one end, put the finger in, and the longer it is kept there the better. The combat between the lemon and the felon is a fight to the death, and the lemon always comes out victorious, so says one of our exchanges. It will not cost much to try it.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**AMADOR QUEEN.**—*Ledger*, Jan. 21: The protracted siege of litigation which this mine has passed through in the past year has terminated, for awhile at least, by the filing on the 13th instant of a mortgage executed by the officers of the Amador Queen Mining Co. in favor of E. Ginocchio for the sum of \$9464.12, with the interest at seven per cent per annum. We understand that nothing can be done by the company in the way of working the property until this mortgage is satisfied. The mortgage embraces the two mining claims, mill, and indeed all the property of the company in this county except the concentrators in the mill.

**DRYTOWN.**—*Amador Ledger*, Jan. 21: Drytown is situated about midway between Amador and Plymouth. It is a very healthy locality, and in the center of a rich mining district. The quartz-mining interests of this district are looking up, and there are a number of good mines here that only need capital to develop them. The Gover, Loyal Lead, Cosmopolitan, Potosi and several others are being worked with encouraging prospects. In early days this was one of the most lively mining camps in the mountains. The town has been destroyed by fire several times, and each time but partially rebuilt. The placer diggings finally gave out, and the miners and most of the business men sought other fields. No placer mining is being done now, except by a few Chinamen who are working mostly in the bed of the creek.

**LINCOLN.**—The four men who have leased the Lincoln are at work, and it is expected that no further trouble between the Lincoln and Maboney mines will occur.

**AMADOR DIAMONDS.**—*Dispatch*, Jan. 21: It is reported that several diamonds were recently found in the Cleveland mine, near Volcano, but we have been unable to learn their exact size or value. We also understand that two or three of these precious stones were found a number of years ago in the same vicinity, but as there was no one here at that time who understood diamond mining, the matter was soon almost forgotten.

**BUNKER HILL.**—On the Mayflower claim, which belongs to the Bunker Hill Co., and lies between the Bunker Hill mine and mill, a tunnel has been run 1300 feet from Rancheria creek in an easterly direction, at a point about 100 feet south of the mill. This work has been pushed ahead quietly for the last 18 months. At the distance of 1300 feet from the mouth a ledge was cut three feet wide. It has not been opened to any extent as yet, and nothing is positively known about its gold-bearing qualities, but its appearance justifies the opinion that it will prove fair-milling rock. Preparations are now being made to work this ledge. A contract has been let to erect hoisting works at the mouth of the tunnel on Rancheria creek, which is intended to hoist the car of rock 60 feet above the tunnel level, to an elevated track, from whence it will be run to the ore-bin.

**MISCELLANEOUS.**—The Zeile mill has been idle nearly the whole of the week, on account of sinking the shaft. The sinking progresses slowly; only one set of timbers have been placed in position as yet. It is intended to go down about four sets or 20 feet, which will probably take two or three weeks to complete. The main object is to enlarge the ore-chute at the 800-foot level, which has heretofore been altogether too small for the requirements. A telegram was received by John I. Minear, superintendent of the Amador gold mine, from the company's head office in New York, stating that arrangements had been made for the erection of a 60-stamp mill, at an agreed price of \$52,000; the mill is to be in running order by the 1st of August next. Work at the Wetzel claim, near Middle Bar, has been suspended for the present.

## El Dorado.

**SINKING COMMENCED.**—*Georgetown Gazette*, Jan. 21: The new pumping machinery at the Alpine mine, 2½ miles southwest of town, is in place, and sinking has been commenced.

## Inyo.

**SAN CARLOS MINE.**—*Independent*, Jan. 21: At the San Carlos mine recent developments are very favorable. An ore body was struck a few days ago in the tunnel the extent of which is not yet known. The vein is 3½ feet wide, and of this two feet is solid ore. On Wednesday one man took out a ton of this that is worth \$100. At the beginning of the tunnel the ground was very hard, but during the past month it has been much easier. Mr. Russell is pushing the work along as usual.

## Mono.

**BODIE.**—S. F. *Examiner*, Jan. 24: Ex-District Attorney Richard S. Miner of Mono county leaves for his home in Bodie to-day. Captain John Kelly, superintendent of the Lent shaft of the Bodie and Mono Co.'s, arrived yesterday. They report that the roads in and about Bodie are now open, and that work is progressing steadily on the aforesaid shaft, and on the Standard Co.'s property. A few other less noteworthy prospects are also being worked, and in all about 100 miners are working at Bodie. It is expected that the Lent shaft will reach a second contact, and if it does, a new impetus will be given to mining there, so they say, and the camp which in 1880 had nearly 9000 people, and which now has only about 700, will forge to the front rapidly. "One thing that is against working our low ores," said they last night, "is the high price of labor. Bodie and Virginia City are the only mining towns in this section of the coast that are paying \$4 a day. If we could get the work done for \$3 to \$3.50 a number of other mines would be worked. The Standard has recently paid a dividend of ten cents a share."

## Nevada.

**COLUMBIA HILL MINING DISTRICT.**—*Nevada Transcript*, Jan. 20: Mr. Bigelow, who is running 500 feet of tunnel for the Delbi Mining Co. on a contract made at \$10 a foot, had for some time found the ground very hard and the profits correspondingly small. Recently, however, soft ground was entered and the works are now going along swimmingly much to the gain and general satisfaction of the

contractor. At the El Dorado the contractors recently quit work on the tunnel by consent of the owners, the ground being so hard as to render the job a losing one at the specified rate. Three men who are paid day's wages are driving the tunnel, and it is estimated that they will reach the ledge within a distance of 80 feet from where they now are. A. E. Helm and G. Jones have relocated the claim called the Pittsburg and situated on the north bank of the Middle Yuba which was taken up last year by Messrs. Englebright, Beckwith & Co., of this city. The latter gentlemen did not perform \$100 worth of labor on it in 1887, but as they did not locate it till after January of that year they claim that it is not yet open to relocation. The old San Juan ditch on the Middle Yuba is said to be falling into decay so far as its flumes are concerned. It is reported that the Grant Mining Co., which has been depending upon it for water, will therefore build a dam in the river some distance above their claim and bring the water down in a private ditch which will give them ample power. The Nevada City gentlemen who own the south extension of the El Dorado have named their claim the Dictionary. They say they selected this title "because the dictionary is the only thing that contains health, happiness and prosperity." They expect to find health in taking frequent trips up to the mine, happiness in anticipating that it will prove the biggest bonanza in the county, and prosperity in the golden returns they will realize when they once get it developed.

**MAYBEST.**—*Cor. Nevada Transcript*, Jan. 20: During this extreme cold weather we have kept our hoist and pumping machinery running with a few hours stopping in the morning to cut ice out of flumes and bulkheads. Since the 14th inst. it has been too cold to run the mill. Water freezes in the feed pipes and in the silver plates. Here again we have an illustration of the superiority of the hurdy over the overshot water-wheel. The hurdy wheels are free and running, where overshots are froze solid until the next thaw relieves them or the dangerous work of cutting them loose is resorted to. The latter endangers life and machinery. The Eagle Bird Mining Company had been running only their pump for some time. Finally it ceased to do duty. Their aqueduct froze solid. The mines that have been crushing ore in this district have paid well up to the time Jack Frost shut them down. Some of the prospectors have suspended operations until warmer weather. Those that have tunnels to work can keep to work. I am informed that Tiernan has resumed work in his tunnel on Lindsey Hill. The Cressus Co. have been fitting up to sink a shaft on the pay chute in their tunnel. The expectation is that there will be mills running this coming season on the Cressus, Blue Jay, Rising Sun and Tiernan mines. John Grissel and Foster intend starting their mill to crushing ore from the old Champron or Governor Morton mine as soon as the weather permits. When the above mines, which are all proving valuable, get machinery erected and crews of men to work, then the South Yuba river will be one of the leading mining districts in the county of Nevada.

**NORTH BANNER MINE.**—*Grass Valley Union*, Jan. 21: Thursday, this reporter in company with Mr. George Fletcher, managed to make his way to the mine of the Consolidated Tunnel Company at Banner Hill. The tunnel is now in about 900 feet, and is being pushed ahead as rapidly as is necessary. About 100 feet from the face of the drift an upraise of about 48 feet has been made, uncovering a ledge of quartz which would be an excellent thing for any mine to hold within the confines of its treasure chambers. The ledge varies from two feet to three and one-half feet in thickness, displaying on its lower side rich ribbon rock, literally filled with sulphurets and galena, while the entire ore from the large ledge is considered No. 1 milling rock. In the face of the drift this same ledge is beginning to show itself, and no doubt but that a few feet further on the miners will run into it, disclosing its full size and beauty. The owners of the North Banner have reason to feel proud over their late developments, for every one who has seen the ore spoken of above unhesitatingly pronounces it of exceptionally good quality. Then the general surroundings are very flattering. The walls in many places show sulphurets of good quality. This "cap sulphurets" is considered to be the very best indication. The sulphurets from the ledge are very rich, in fact the ore itself is high grade, and much of it will be shipped to the smelting works, San Francisco, for treatment, as it contains a very large per cent of silver. With the employment of a comparatively small number of miners, ore enough to run a 20-stamp mill can be easily extracted from the Banner. There are now only five stamps in the mill at the mine, and they will be dropped as soon as the company can get water. Mr. Wm. May, an experienced millwright, has just finished the job of putting in two new Triumph concentrators, and the entire mill is now in readiness to run, with its ore station filled with as lively looking quartz as one would wish to see.

**RICH GRAVEL STRIKE.**—*Foothill Tidings*, Jan. 20: After running a tunnel and sinking three shafts, Alfred Jenkins, John Cunningham, Joseph Bartell and others have discovered a gravel channel near Rough and Ready. The bank is five feet thick and is of cement gravel which pays \$1 to the ordinary windlass tubful. One or two rich cleanups have been made, the cement being worked by the washing process. A whim is now to be erected and the channel prospected sufficiently to determine whether or not the construction of a mill will be warranted. Messrs. Jenkins & Co. have a lease of the claim with the privilege of purchasing. A recent organization styled the "Pet Gravel Mining Company" have bonded the extension of the claim operated by the parties named in the foregoing, and will commence work as soon as weather permits. It is very likely mining for gravel will shortly be very lively in the neighborhood of this strike, as indications lead to the belief that the tail end of the old Alta Hill lead has been found.

**PAY GRAVEL.**—*Foothill Tidings*, Jan. 18: Chas. Mill and a company of practical miners have been working the Old Jennie Lind gravel claim, situated back of Alta Hill, for several months past. A good-sized bank of cement gravel, which prospects exceedingly well, has been encountered, and now a 10-stamp mill is in course of erection, a sufficient indication that there's pay in sight.

## Placer.

**GOLD.**—*Placer Herald*, Jan. 21: Harold Power last Monday brought down 300 ounces of gold, the

December cleanup of the Hidden Treasure mine at Sunny South.

## San Diego.

**ELSINORE COAL.**—*Pasadena Union*, Jan. 21: A carload of Elsinore coal from the Cheney coal mine, in San Diego county, was side-tracked at South Pasadena Saturday evening, consigned to D. M. Graham, one of the owners of the mine, who resides at that point. This is the first carload of coal ever shipped from this mine, and is also the first carload ever mined in Southern California and shipped away from the mine. It is the initial car of many to follow and marks an important era as the beginning of a new industry in Southern California. The coal, while slightly inferior to the Australian coal, ignites readily and burns to a clear white ash. The Cheney coal mine is six miles from Elsinore station, but when at that distance the coal can be mined and placed on the cars and shipped to this city at one-half the present ruling prices. The Elsinore & Pomona railroad, now in course of construction, will run by the mine, and the coal can then be mined and shipped to this city and Los Angeles at a cost not to exceed \$4.50 per ton. Mr. Wm. Collin, one of the owners of the mine, was in this city Saturday and informed a *Union* reporter that they had lately opened up a ten-foot vein, and the farther in they drifted the better they found the coal. Too much importance cannot be attached to this item, as the scarcity of fuel and the cheapness with which this very desirable article can be obtained is something which will interest every citizen in Southern California.

## Sierra.

**TO BE REOPENED.**—*Foothill Tidings*, Jan. 20: The old Graphtine mine in Sierra county, a mile above the Plum Valley House, is to be reopened in the spring by a strong company. Eight years ago more or less work was done on the claim and a stamp-mill erected.

## NEVADA.

## Washoe District.

**CROWN POINT.**—*Virginia Enterprise*, Jan. 21: Are not taking out any ore now, on account of the lack of milling facilities, and will not until the expiration of the lease of the Mexican mill to the Savage and of the Vivian to the Hale and Norcross, but active prospecting work will be prosecuted.

**BEST AND BELCHER.**—On the 425 level west crosscut No. 2, opposite east crosscut No. 2, has been extended 23 feet; total, 358 feet. The formation continues in block porphyry. East crosscut No. 3, 400 level, 400 feet north of south line, has been extended 45 feet in vein porphyry and quartz. West crosscut No. 2, opposite east crosscut No. 1, has been extended 34 feet; total, 91 feet. This crosscut has passed through vein porphyry and has penetrated the footwall of the vein.

**OCCIDENTAL.**—No. 1 upraise in the upper tunnel of the north incline winze has been carried up 10 feet; total height, 49 feet. No. 2 upraise, 74 feet north of the north incline winze, has been carried up 12 feet; total height, 61 feet. At the top of the south winze connection on the 48 level, a south drift has been advanced 8 feet. From the openings have extracted 35 tons of fair-grade ore. Are re-remembering a portion of the lower tunnel and repairing the track.

**HALE AND NORCROSS.**—On the 400 level the north drift is advanced 45 feet and the south drift 48 feet. On the 700 level the ore development shows further improvement. From the top of the south upraise they have drifted north 25 feet, and all the drift continues in excellent ore. The south upraise is now 60 feet above the track floor and continues in fine ore. The severe cold and stormy weather has temporarily interrupted the reduction of ore at the mills.

**SAVAGE.**—On the 600 level the south drift was advanced 30 feet, and the face of this drift is entering ore of good grade. Are extracting ore from the several levels between the 400 and 900 stations. The freezing of the Carson river still prevents the usual shipment of ore to the Mexican mill.

**BELCHER.**—The 500 level south drift is in 73 feet in favorable-looking ground. The management will commence crosscutting immediately on the 400 level, 240 feet south of the line, but will not commence crosscutting on the 500 before two weeks, or until the 500 level south drift of the Crown Point reaches the line.

**YELLOW JACKET.**—The usual work is going on in the mine, and are shipping 230 tons of ore daily to the Brunswick mill, which is running on steam. As soon as the river thaws out they will run with water-power again. They have 500 tons of ore at the Santiago awaiting that mill to start up for reduction.

**UTAH.**—The east crosscut on the 422 level from the north drift from the end of west crosscut No. 6 has been extended 30 feet; total length, 80 feet. This crosscut has passed through the clay and quartz mentioned in last report, and the face is in hard porphyry.

**GOULD AND CURRY.**—Small drifts are being run in the old stopes on the 250 and 300 levels, and some good ore is found. The south drift on the 1300 level from the east crosscut has been extended 41 feet; total, 144. Formation, porphyry with streaks of quartz.

**CHOLLAR.**—The work of sinking the incline to the Suro tunnel level is progressing. General progress is reported in the several drifts throughout the mine. Are fitting up the other half of the mill to run according to the Logan process.

**SCORPION.**—The severe, cold, stormy weather has interrupted work at the mine since the last report. The usual work was resumed Tuesday. The north drift is advanced 60 feet and the south drift 52 feet.

**ANDES.**—Are running west on the 350 level, and drift now in porphyry. Running east on the 240 level and occasionally encounter quartz containing a little ore.

**WEST CON. VA. AND CAL.**—Good progress is made in sinking the shaft. Have had a little surface water to contend with during the week.

**SEGREGATEO BELCHER.**—The southwest drift from the raise is now in 60 feet. The ground run through shows no change for the week.

**ALTA.**—The past week have been thawing out

pipes preparatory to the resumption of the usual work at both the mine and mill.

**MONTEZUMA CON.**—The very severe weather of last week delayed operations, but are now doing work in the tunnel.

**BULLION.**—The shaft has now attained a depth of 450 feet and the work is progressing well.

**POTOSI.**—The stopes on the upper level are yielding their usual quantity and quality of ore.

## Columbus District.

**CANOE LARIA.**—*Walker Lake Bulletin*, Jan. 18: The Candelaria mill is running 20 stamps continuously upon ore from the Georgene mine. In this mine a large body of ore has been developed in the east drift from the second shaft level. The face is three feet wide and of good quality. The first level and the intermediate levels between the first shaft level and the tunnel level are producing high-grade ore. The third level shows low-grade ore in the face of the east drift. It is rumored in Candelaria that the Holmes mine is about to change hands and be worked by the Candelaria Co. Col. Sutherland was interrogated regarding the rumor and he refused to either admit or deny its truth, but the general appearances indicate that a change will soon take place, in which event work will be vigorously prosecuted and Candelaria will be again one of the most prosperous mining camps in Nevada.

## Dun Glen District.

**ANOTHER MINE SOLD IN THAT CAMP.**—*Silver State*, Jan. 18: Dun Glen is experiencing a mining boom and the prospects are fair for the camp becoming one of the liveliest in the State in the spring. Last week J. V. McCurdy purchased the Lang Syne mill and mine, and now Thomas G. Morgan has purchased the Golden Chariot mill and mine of Thomas & Hendra. Both purchasers are live men and experienced miners, and intend to increase the capacity of the old reduction works materially by the addition of Huntington crushers and concentrators to the present stamp-mills. Mr. Morgan was superintendent of the Pittsburg mine in Lander county up to the time it was sold to its present owners, and Mr. McCurdy is superintendent of the Paradise Valley Mining Company. The mines, which adjoin each other, are both gold-bearing and well-defined leads. A force of men will be put to work on each as soon as the weather will permit, the Lang Syne being under the superintendence of T. D. Soper, and the Golden Chariot under that of L. W. Getchell of Austin.

## Hawthorne District.

**LAPANTA.**—*Cor. Reno Journal*, Jan. 21: The first mine I visited was the Lapanta. This mine was discovered in 1886 by Mr. John T. Bradley and afterward passed into the hands of Messrs. Yerrington, Bliss, Senator Forbes, Tohey, Knapp and Laws and the Garfield Mill and Mining Company. The mine has produced over \$100,000, 25 per cent of which was divided among the owners. This amount was the result of one year's labor in 1886 and 1887. After that the mine was regularly incorporated and embraced the well-known claim now known as the Esmeralda, which is to-day the eastern extension of the Lapanta. When this incorporation was perfected the company immediately set about to develop the resources of the section in which both mines were located. Since that time they have spared neither time nor money to determine its value. The result of the last run of 135 tons made at the Kinkaid mill, nine miles north of the Lapanta and on the line of the C. & C. railroad, resulted in a total production of \$14,000. This speaks for itself, which I noticed, as I did in the Georgene and other mines in Candelaria, that they had large bodies of ore in sight. This mine is composed of free milling decomposed quartz and the average per ton of its productions can easily be determined by the above figures. The profits arising from this valuable property are not so much due to the intrinsic value of the ore as they are to its close proximity to the railroad and more especially to the fact that the mill is on its line. After completing my investigations in the Lapanta, I proceeded to the famous Pamlico mine and there I learned it was located in 1878 by its present management, Senator Forbes, H. M. Yerrington and D. L. Bliss. The mine is superintended by Mr. S. V. Hauger and is in splendid condition. It lies about one mile south of the Lapanta and employs quite a number of men. Since that time it has declared three dividends and is still being worked to great advantage. The last dividend declared netted the stockholders something over \$700 per share, while the ore taken from it, now being crushed at the Kinkaid mill, is as rich as any that has yet been taken from its recesses. The ore is of a similar character as that of the Lapanta, but is found in a different formation, being porphyry and talc, while that of the Lapanta is in limestone. This mine is one of many in the Hawthorne district that enables the Kinkaid mill, owned by Senator Forbes and S. A. Knapp, to be kept in constant operation. Capital is wanting here and prospects are numerous, while several properties are being worked successfully.

## Silver Peak District.

**MILL CLOSED.**—*Esmeralda News*, Jan. 21: Owing to the severity of the weather and the consequent freezing of water-pipes, the Silver Peak mill is closed. It will resume work in about ten days. The snow has not obstructed the road between Candelaria and Silver Peak. The stage makes its regular trips. The Shawmut Mining Co. continues to extract and ship large quantities of ore from its mines at Montezuma district to Candelaria.

## Tuscarora District.

**BELLE ISLE.**—*Times-Review*, Jan. 21: East crosscut from west vein, 250-foot level, extended 4½ feet.

**NAVAJO QUEEN.**—Have sunk and timbered 7 feet during the week; total depth of shaft, 173 feet.

**PONDERE.**—Are making excellent progress with east crosscut, the ground working very favorably.

**FOUND TREASURE.**—Crosscut, 150-foot level, has been run 30 feet during the week. The gangway vein, which carries the same grade of ore at this point as it does in the gangway of old works, has been reached, and a drift started on it.

**NEVADA QUEEN.**—South drift on the 100-foot level has been advanced 15 feet; total, 61 feet. North drift, same level, has been extended 19 feet; total, 103 feet. 350-foot level, No. 2 crosscut, has been driven 17 feet. Strata of softer porphyry are en-



countered every few feet; looks favorable to soon get into better working rock.

**NAVAJO.**—South drift, west vein, 350 level, extended 4 feet; west crosscut No. 2, same level, extended 6 feet; face in both looking favorable.

**COMMONWEALTH.**—North drift on the 100-foot level has been advanced 12 feet, the ore being very regular, ranging from 3½ to 4 feet thick. Average assays of ore hoisted during the week, \$286 per ton.

**NORTH BELLE ISLE.**—North drift from No. 3 crosscut, 70-foot level, extended 8 feet, total length, 27 feet. Ore continues high grade. The stopes are looking well and continue to yield as usual.

**GRAND PRIZE.**—South intermediate drift from winze No. 1, extended 10 feet; total length, 41 feet; face of same still showing a strong ledge of high-grade ore. Stopes from winze and above the drift turning out well.

## ARIZONA.

**TURKEY CREEK DISTRICT.**—Prescott *Courier*, Jan. 18: Thomas Roach, of Turkey creek district, is stopping at the Pioneer hotel. He is an owner in a rich silver mine and has shipped a great deal of ore which has brought big money to this town and section. Mr. Roach is not a talking man, but we, nevertheless, coaxed from him the information that John Holmes has some very rich ore in his dumps; that Mr. Henszey has succeeded in his efforts, the result of which will be the addition of ten more stamps to the Morning Glory mill and the working of several gold properties, early next spring; that Capt. Brann has very rich ore in the Volunteer mine. F. M. Murphy has news of the finding of a very rich deposit of loose ore in the Congress mine, Martinez district. Ore is rich in gold and easily mined. T. W. Groves, a Colorado miner, has been in Big Bug district, and speaks in high terms of the Boggs mine and others. He will next visit Walnut Grove district; says that if several mines he has seen here in any part of Colorado, they would be worked and paying dividends.

**MILL WANTED.**—Clifton *Clarion*, Jan. 14: Clifton should have a custom-stamp mill by all means. It is probably the only way in which our claims can be developed and made salable. Shipping ore never proves satisfactory to mine-owners, but rather tends to discourage them on account of the large portion of the value of the ores being eaten up in transportation. That a custom-mill would pay in the district there is no doubt. It is estimated that there is gold ore enough on top of the ground in the district to keep a 10-stamp mill running a year at least at a good profit to both mill and mine-owners; and there is not a gold claim here that has been developed worth mentioning.

**SQUAW CREEK.**—Letters from well-known miners and others, at the Clarence-Ruby mine, in Squaw creek, contain good news. The mine is large and very rich in gold. The mill was erected under great difficulties, by Mr. Robert Cartmell of Prescott, who has made a success of it. It was started recently, and after a 24-hours' run \$400 in gold was caught on the plates. The concentrates contain about as much more. So the trial run was a success in every respect, and we are pleased to record the fact, for the sake of the county, the superintendent, N. Ellis, and the mill constructor and runner, Robert Cartmell. Frank Alters, just from the Catacino mine, informs us that a new body of ore recently found by him in the mine assays 450 ounces in silver and \$60 gold per ton.

**SILVER.**—Prescott *Courier*, Jan. 18: Jos. Howell has arrived from Riggs Lawler's great mine. It is four feet thick in the shaft and very rich in silver. Can't ship, owing to muddy roads. Thousands of tons of high-grade ore in sight. Experts who have examined the Lavler copper mines pronounce them the richest in the west. The Senator mine, Hassayampa district, which yielded half a million in gold, will be worked next spring. Not an inch less than 100 feet in width is Dan O'Boyle's Montgomery mine. It is gold bearing; can be concentrated very effectively. Sam Bright, who owns the richest piece of quartz that came from the Howard mine, has consented to place it in one of Kelly & Stephens' show-cases. It is about the size of a hen's egg and the owner would not take \$100 for it. Howard people are now taking out very rich ore. The Bank of Arizona had yesterday about \$10,000 worth of quartz and placer gold, which was taken out in the last week.

**ETTA.**—Prescott *Courier*, Jan. 21: The Etta gold mine is in Cherry district, about 35 miles east of Prescott. It was discovered and worked by Jack Hardy and others, who sold it to prominent business people of St. Louis, Mo. Their agent here, John J. Hawkins, contracted with two good miners, John S. Johnson and Thomas Reese, to sink the shaft deeper and run the tunnel to a connection with it. The work is completed. The shaft is in the neighborhood of 200 feet deep; tunnel 275 feet long, and the vein, which is rich in gold, is from four to six feet thick. More miners will soon be put at work in it, and, as the company own a ten-stamp mill on Verde river, about four miles from the mine, bullion, in large quantities, will soon be shipped from the Etta, which is, to-day, considered the best gold property in Arizona.

**HOWARD.**—The Howard gold mine, ten miles south of Prescott, is still in a very healthy condition. The small shaft is, as yet, scarce 30 feet deep, and yet about \$30,000 in gold has been taken out of it. W. W. Vanderbilt examined the property Thursday last, and yesterday stated that it was in splendid condition. One of its owners, Mr. Barrington, was in Prescott yesterday and confirmed what Mr. Vanderbilt said of it. They are now drifting north and south, getting rich pieces of quartz and plenty of ore that will pay well when pulverized in an arrastra. The owners run an arrastra by water-power.

## DAKOTA.

**GOOD ORE.**—Black Hills *Pioneer*, Jan. 14: Lessees of the Adelphi, Carbonate camp, are said to have struck some very good ore in the mine, which they are following, it increasing in size as their explorations continue. A bonus of several hundred dollars has been offered for the lease, which was promptly declined, the boys being confident they have a good thing, and willing to stick by it. M. R. Russell, on behalf of the National Gold Mining and Milling Co., Wednesday filed application in the

land office for patent on the Segregated I. N. L. claim, located in Poorman gulch. The property is well developed, shows a good body of free-milling ore, and is likely, after further development, to prove as valuable as any mine in Whitewood district. It was stated yesterday, by a man just in from Carbonate, that an excellent quality of ore is now being taken from the Wilkinson shaft. Ore shipments from the Spanish R. will be resumed early next week. There are at present on the dump some 25 tons ready for transportation to the Iron Hill smelter. A day and night shift is being worked with most encouraging results, not a few well acquainted with the property positively asserting that before the year is out this mine will rank second to none among silver-producing properties in the Black Hills.

**NIGGER HILL TIN.**—Deadwood *Pioneer*, Jan. 17: Charlie Finch, an old Bear gulch miner, reports the work done at that camp during the winter as being greater than any previous one for several years past, and with better results and prospects. Some 35 men have been constantly working on the several properties, and the result is that a feeling of confidence has deepened and strengthened with all that bodies of tin ore exist in larger extent than had formerly been thought. Orders have been received from Mr. O'Brien, in New York, to pump the water out of the Cleveland shaft, as the officers of the company would visit the property within a short time, with the intention of commencing operations in extending mining and constructing concentrating works. The Cleveland shaft is 150 feet deep with a crosscut at the 100-foot level 140 feet, all in tin ore. At the bottom of the shaft the ore body increases in quantity and quality.

**CUSTER CITY TIN.**—Samuel Cushman of Custer City says: "Mr. Tanlin, the former county treasurer, drove me out to the Tin Mountain Company's new concentration-mill, and on our return I had the pleasure of dining with him and his excellent wife. The mill had made a trial run and it was found, as might be expected, that some things could be changed to advantage, hence it was not running the day I was there. Mr. A. L. Sirger, the superintendent, gives every detail of the work his personal attention. He has tackled one of the most difficult problems in practical metallurgy, and one of the most hopeful signs that he will succeed is the fact that he is aware of it. He has satisfied himself and all who have investigated that his general scheme of concentration is all right, but that to do satisfactory work he may have to increase his power and modify some of his apparatus. The company at his back is a strong one, including such men as McCormack of reaper fame and millions, Bartlett of Spencer, Hubbard & Bartlett, and other successful men who have taken hold not as a flyer but to win. Confident, as is every one who has investigated, that there is plenty of tin ore and that they have a good mine, they have determined to head the column in finding how to utilize it. The property is about eight miles westerly from Custer and is part of a great group of tin locations, one of which was lately sold to the Harney Peak Company for \$40,000, they paying \$5,000 down. North from Custer is another large group of tin mines; also another in the vicinity of Hill City or Spring creek."

**HAYES.**—Deadwood *Pioneer*, Jan. 14: At the Hayes, work is being pushed on the second contact with most satisfactory results. The force is employed on ore, and that now extracted from the tunnel runs as high as 800 ounces silver per ton. It is principally carbonates and sulphurets, with occasional streaks of galena appearing. The Hester A. company is now pushing developments on the second contact, employing as large a force as can be worked there to advantage. Considerable high-grade ore has been extracted, of which two carloads will be shipped to Omaha next week.

## IDAHO.

**RUMORS.**—Wood River *Times*, Jan. 11: It is reported that 10 feet of solid galena ore was cut in to at the bottom of the Idahoan shaft, yesterday. The superintendent has been expecting ore for a few days, but hardly that width of it. If the report is true, the Idahoan will, ere long, resume her former place and rank as the banner mine of Idaho. Another rumor, which has been afloat for about one week, is that a vein of 1000-ounce ore was struck, during the holidays, on the Bullion tunnel level by the miners in Professor Jenney's employ. This, too, is not much of a surprise. In fact, it would have been much more surprising if the strike had not been made once operations were conducted to that end, in that direction. With the Idahoan resuming dividends, the Bullion-Ophir-Durango ditto, the Red Elephant building a concentrator, the Rising Sun running to connect with the Bullion-Durango tunnel, the Mayflower resuming work on a large scale—all this to be under way about March or April—Bullion ought to boom next summer.

**GRAHAM.**—Cor. *Inter-Idaho*, Jan. 11: The town of Graham is about 60 miles in a northeasterly direction from Idaho City, and is situated on the banks of the North Boise river, about 12 miles below its head. This river forms the boundary line of Boise and Alturas counties. The mines are located in the neighborhood of one mile and a half from the millsite, from which there will be a tramway built in the spring to convey the ore to the mill. The Julia is the principal mine of the district, and it is estimated that the body of ore already in sight in this mine is large enough to run a 20-stamp mill for several years. Besides the group of mines owned and worked by the company, there are several prospects which look very promising. Before leaving here Col. Matt Graham, one of the principal owners and general manager for the company, made all necessary arrangements for the construction of as much of the mill as possible this winter and to otherwise facilitate matters for spring. Mr. Mahan, the master mechanic, and Mr. McCarthy, foreman, have been as busy as beavers up to this time drafting and framing, notwithstanding the inclemency of the weather. It is calculated that there will be 200 to 300 men at work here on the mine, mill and tramway in the spring—a fact which gives a pleasant outlook to the future prospects of North Boise. It is useless for any one to attempt getting in here till spring, except on snowshoes, as there is 10 feet of snow on the summit between here and Idaho City, with frequent snowslides, which makes the trip extremely perilous.

**EAST FORK OF SALMON RIVER.**—Ketchum *Key-*

*stone*, Jan. 20: The Parnell mine, located in the Germania basin, reports say, is looking extremely well. The development work that is being done this winter is opening up large bodies of high-grade ore. Only two miners have been employed during the winter, and they are extracting two tons of high-grade ore per day with fine reserves in sight. The Bible-back mine is also located in the Germania basin, and owned by Chris. Johnson and others, who have great faith in making a mine of it at no distant day. The present developments are looking very favorable and encouraging.

**GALENA.**—The Alturas Consolidated Mining Co., having headquarters in New York City, owning an extensive group of mines at Galeña, are extending their tunnel to strike their Gladiator lode at a depth of from 400 to 500 feet. The tunnel has attained a distance of 700 feet in length, and according to survey must be nearing the ledge, unless the pitch has materially changed from its angle ascertained near the surface.

**WELLINGTON.**—The mine is now being worked under a lease with favorable results. A great deal of work has been done on the mine, and it has produced a considerable quantity of ore of a good grade for the past two years; no depth of any consequence has yet been reached.

**SMOKY.**—Reliable information received from Smoky states that a fine strike has recently been made in the Tyrannus mine, owned by J. M. Carter and others. We have not been able to learn full particulars of the development. The Fairview mine, owned by Messrs. Hughes, Nebbler and Kelly, located in Smoky, is said to be prospecting remarkably well.

## MONTANA.

**NEW REDUCTION WORKS.**—Butte *Miner*, Jan. 17: Mr. W. A. Clark is now negotiating a sale of his Colusa mine, concentrator and smelter, and his interests in the Mountain Chief and Piccolo, to the Boston Consolidated. The price to be paid is in accordance with the importance of the deal. This sale will enable Mr. Clark to concentrate his energies on the important works he now has in preparation. It was stated in the *Miner* some days ago that the matte furnaces of the Butte Reduction Works were being enlarged, and it can now be added that new reverberatory furnaces have been ordered and will soon be placed in position at the works. As soon as spring opens new concentrating works of large capacity will be erected. These works will be for treatment of copper ores from Mr. Clark's properties here and the Bell mines at Thompson Falls. If he can obtain reasonable rates from the Northern Pacific for the transportation of galena ores from the Cœur d'Alene, he will also erect large lead works, and it is not likely that the railroad will miss the large traffic that will thus be insured.

## NEW MEXICO.

**ORE.**—Silver City *Enterprise*, Jan. 20: The car of ore shipped from the Asiatic mine at Pinos Altos by the Ateste company turned out very well, and it demonstrates beyond any question the value of the property. The ore ran \$30 in gold and silver and 15 per cent lead, making it run all told about \$40. The ore was an average of the dump, and if anything, lower than what the ore now being taken out is.

**CONCENTRATES.**—A carload of concentrates will be shipped from the Key to-morrow. The last shipment of concentrates averaged \$200 per ton. About 170 ounces of gold retort will be shipped from the Key about the 25th instant.

**BANNER.**—Nick Rascom came in from the Banner last week and reports everything prosperous at the mine. If the Banner company would erect a mill it would have a good-paying property. Ore that will pay to haul 40 miles ought to be a regular bonanza.

**BOSS.**—Twelve sacks of ore are ready for shipment from the Boss mine near Georgetown, which is expected to net \$4000 or more. Some of the ore is worth from \$7000 to \$2000 per ton. Malcolm McGregor recently bought a one-third interest in the mine for \$1000, and this shipment will more than pay the money back.

**MOGOLLONS.**—Capt. M. Cooney came in from the Mogollons this week. He has now got his mill on the ground, and will soon be ready to start up. His mill is situated in a canyon between two of his mines, one of which will average four feet of \$50 ore. The vein has been uncovered at different places on top for 4500 feet. The Captain estimates that he can mine and dump his ore on the grizzlies at the mill for \$1 per ton, and be in confident that he has a world of it.

**UNFAVORABLE.**—People familiar with mines in Mogollons anticipated an unfavorable report on the Sheridan mine by John B. Farrish, and they were not mistaken. His report was a hard blow to the stockholders, many of whom even yet have confidence in the property. Mr. Farrish, after a careful sampling finds the ore taken out for treatment by Superintendent Harlan to be almost worthless. In substance he advises the stockholders to abandon the mine. Mr. Farrish has an excellent reputation in this section as an expert and general good practical mining man, and great weight is given his opinion notwithstanding his examination of the mine must have necessarily been very hurriedly made, as he spent but one day in the camp. His assays of ore are understood to have been from \$2 to \$10 per ton.

**VIRGINIA.**—Socorro *Bullion*, Jan. 14: The Virginia mine, located at Kingston, and formerly owned by Wallace, Parks & Evans, has been sold to the Templar Mining Co. for \$150,000. This camp is rapidly becoming noted for its rich mining properties and may prove a second Leadville. I. S. Lapham reports the Pinos Altos district in a prosperous condition, and says that the Silver City people place great confidence in the future of that camp. The Aztec Co., in which Col. Lapham is a prominent stockholder, controls ten claims, and it is the company's intention to sink the properties to depths ranging from 200 feet to 500 feet during the year. The ore bodies on some of these mines were but 15 inches when work was first commenced on them, but they are now five feet wide and steadily increasing. Among the mines now being worked are the following: The Mountain Key, in the hands of a St. Louis company in which Gen. Boyle is the principal

stockholder, is now down about 3000 feet, and the mineral increases in value as depth is attained. The mine produces gold ore which runs \$125 to the ton. The parties interested in this property are spending money freely in its development. Wm. Nourse, one of Hermosa's leading mining men, brought three carloads of ore from the Pelican-Eagle group to the Socorro smelter this week. This group consists of the Pelican, Vulture, Eagle and Albatross mines, all of which are rich-paying properties. The ore brought here runs \$152 and \$185 per ton. A lease for 250 feet has been let to Donald McRae and one for 300 feet to Wood and Read on these mines.

## OREGON.

**THE POCAHONTAS MINES.**—Cor. *Bedrock Democrat*, Jan. 20: I have noticed in recent issues reference to mines, placer and quartz, situated in Pocahontas mining district, and while you seem to be well informed regarding the district you have overlooked several mines worthy of mention. August Pulnoi is the owner of a valuable placer claim in this camp, and has, perhaps, produced larger nuggets than any claim in the district. J. H. Ingraham is also the owner of rich placers situated on Mill creek about 1½ miles from the celebrated Salmon creek purchased by Oakland, Cal., capitalists for the enormous sum of \$335,000. The Ingraham mine has a fair resemblance to the Salmon creek placers, and has every evidence of being just as extensive and valuable. The placers of Pocahontas district are evidently fed by a gold-bearing quartz range that overhangs the placers. The principal gold-supply vein is the Tom Payne mine, owned and worked for the past seven years with great success by Mr. G. L. Hayes. This mine is favorably situated for supplying the following placer mines with free gold: August Pulnoi's placers, on Crack Pan gulch, which gulch crosses the Tom Payne ledge only a few hundred feet above the placers; the next gulch supplied is the McCord gulch, one of the richest gulches ever worked in the camp. The Tom Payne ledge crosses this gulch about one-half mile above the mouth of the gulch. Every evidence tends to show that this ore vein is the feeder of these gulches, and the ledge can be traced to where it crosses the Salmon creek placers about one mile above the mines. I was talking the other day with the owner of the Tom Payne mine; he informed me he had found a prospect of \$5 to the pan, at a depth of 150 feet from the surface. Ed Hardy, Joseph Manaudas and J. H. Cavin own a valuable quartz mine only a few hundred feet south of the Tom Payne mine.

## UTAH.

**CRESCENT.**—Park *Record*, Jan. 16: Splendid progress is being made with developments in the Crescent, and the results are proving to be fully equal to the expectations of the most sanguine. The winze is now down 214 feet and a large station is being cut out of the ore body. As soon as the station is cut drilling on the vein northeasterly and southwesterly will be commenced. From the first station over 200 feet of drifts on each side of the mammoth incline shaft have been run, and large quantities of high-grade ore extracted from the contiguous stopes. As depth is attained on the vein it increases in size and richness.

**THE SAMPSON WORKINGS.**—About 35 men are employed at the Sampson, and developments are going ahead with great vigor. The stopes continue to look well, and whenever the condition of the road admits of it ore shipments will go to market. Drifting and stopping on the upper levels are being pushed, and by spring the vein will have been advantageously explored. Excellent drainage and good air circulation have been the rule and not the exception since connection was made from the old workings to the drain tunnel.

**AT THE ANCHOR TUNNEL.**—Work in the Anchor drain tunnel is going ahead again with all possible speed, and the usual rapid headway is being made. The disastrous snowslide on the 4th inst., however, caused a slight interruption in the progress of the work. Within a couple of months or so the connection with the intermediate shaft workings will have been made. The total distance reached so far is about 1900 feet.

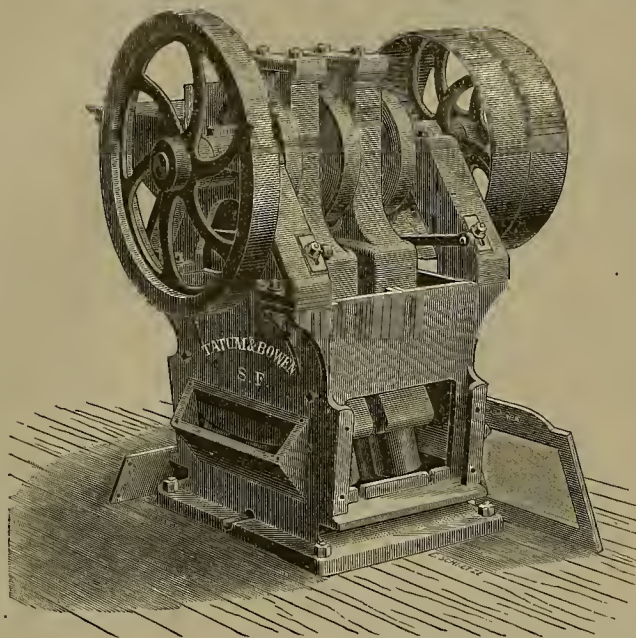
**ONTARIO NO. 2 SHAFT.**—Sinking on No. 2 shaft of the Ontario is still being pushed and the 1200-foot level will soon be reached. After a station is cut and a large steam pump set to work, drifting on the course of the vein will be commenced.

## WASHINGTON.

**MINES OF SALMON RIVER.**—Ellensburg *Capital*, Jan. 20: The estimate made by parties familiar with the Salmon river mines, that fully 10,000 people would be attracted to that country this year, is by no means an exaggerated one. Prospectors have demonstrated that the country is extensive enough and the mines permanent and rich enough to support a large population. And yet the country has only been prospected. When it has been developed and the mines opened to a degree of productiveness requiring the establishment of mills, smelters and reduction works, no one can state the number of people Salmon river will support. The mines are in their infancy, the deepest scarcely attaining a depth of 100 feet, with but few levels or crosscuts; yet this small amount of development work has exposed bodies of rich ore sufficiently large and permanent in character to justify the erection of reduction works. There are hundreds of good prospects now being worked which will develop into large producing mines, and there are thousands of locations awaiting capital to develop them. It is a big country that will produce its millions of precious metals. Ellensburg is the nearest point from which to reach Salmon river and the mines, and by means of rapid stage, express and steamboat transportation the coming spring, this city, which already has a large trade with that country, can quadruple it and secure the lion's share of travel as well. The Ellensburg, Big Bend & Salmon River Transportation Co., with a capital of \$100,000, can accomplish great results this spring, and while benefiting the rich country to the north and east, can also greatly benefit Ellensburg and the cities of Puget Sound, which have hardly awakened to the magnitude of the country tributary to them. Seattle and Tacoma are live cities, it is true, but they are apparently ignorant of the resources of Central Washington.



## THE DOUBLE "ECONOMIC" STAMP MILL.



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

## AN AUTOMATIC ORE FEEDER

Goes with each Mill. We also have a suitable

### Rock Breaker.

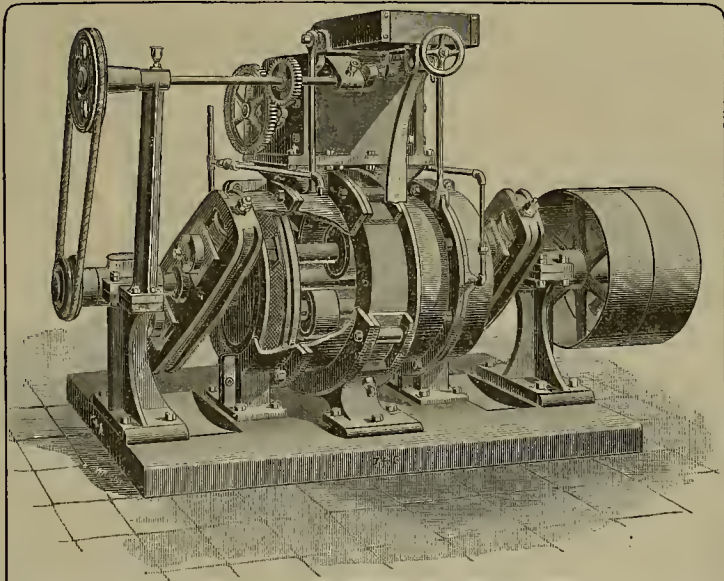
Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

**TATUM & BOWEN,**

34 and 36 FREMONT STREET, SAN FRANCISCO, CAL.  
Manufacturers of Mining and Sawmill Machinery, Engines, Boilers, Etc.

## FRISBEE WET MILL.

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh. Our dry mills are the most economical ever built, and are extensively used with record of several years.

### FRISBEE-LUCOP MILL COMPANY,

GIDEON FRISBEE, Manager, 461 Howard St., San Francisco.  
HOOKER & LAWRENCE, Gen'l Ag'ts, 145 Broadway, New York.

## H. P. GREGORY & CO.

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PERIN BAND SAW BLADES.

STURTEVANT BLOWERS AND EXHAUSTS.

SHIMER MATCHER HEADS.

BRANARD MILLING MACHINES.

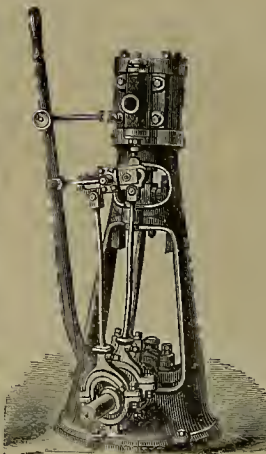
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BRADLEY CUSHIONED HAMMERS.

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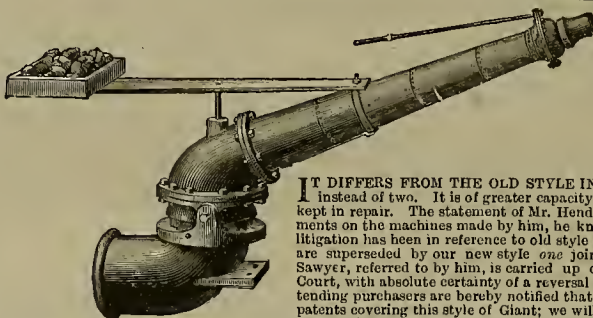
H. W. JOHNS' ASBESTOS PACKING, PAINT, ETC.

YACHT ENGINES.

## ENGINES and BOILERS

FROM 2 TO 100 H. P., ALWAYS IN STOCK

MILL SUPPLIES AND LUBRICATING OILS.



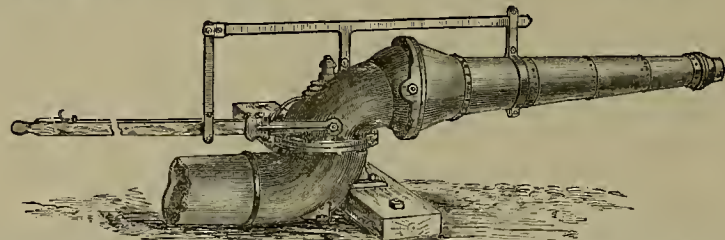
This cut represents our  
**IMPROVED  
HYDRAULIC  
MACHINE.**

IT DIFFERS FROM THE OLD STYLE IN HAVING ONLY ONE JOINT instead of two. It is of greater capacity and more easily worked and kept in repair. The statement of Mr. Hendy that all styles are infringements on the machines made by him, he knows to be utterly false. All litigation has been in reference to old style two jointed machines, which are superseded by our new style one jointed. The decision of Judge Sawyer, referred to by him, is carried up on appeal to U. S. Supreme Court, with absolute certainty of a reversal in our favor. Miners and intending purchasers are hereby notified that we are the sole owners of the patents covering this style of Giant; we will prosecute to the fullest extent of the law manufacturers or users of an infringement.

Send for Circulars and Price List

HOSKIN & CO., Marysville, Cal.

## IMPROVED FORM OF HYDRAULIC GIANTS.



The above cut illustrates the **IMPROVED FORM OF DOUBLE-JOINTED HYDRAULIC GIANTS**, with leve attachment, which we manufacture. All similar styles are infringements upon this form, and a judgment stands of record to that effect, under a decision of Sawyer, Judge of the U. S. Circuit Court, in the case of Hendy and Fisher vs. R. Hoskin et al.

We also manufacture the **single-jointed Giants**.

Prices and Catalogues of Hydraulic Mining Machinery furnished upon application.

JOSHUA HENDY MACHINE WORKS,

39 to 51 Fremont St., San Francisco, Cal.

## HOISTING ENGINES FOR MINES.

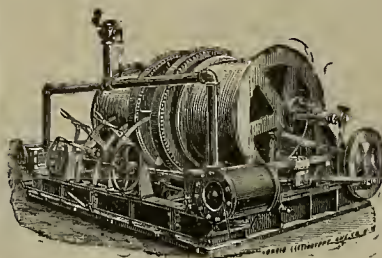
1, 2, or 4 Drums, with Reversible Link Motion or Pat. Improved Friction.

MADE ONLY BY THE

LIDGERWOOD M'FG COMPANY,  
96 Liberty St., New York.

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## STURTEVANT MILL.

This Mill as a Crusher and Pulverizer is without rival. Is in operation in leading smelting works and mills.

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CORNISH ROLLS, JIGS and TROMMELS.

MACHINERY for SYSTEMATIC MILLING, SMELTING, and CONCENTRATION of ORES.

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GENERAL OFFICE AND WORKS: Fulton and Union Streets, Chicago, Ill.

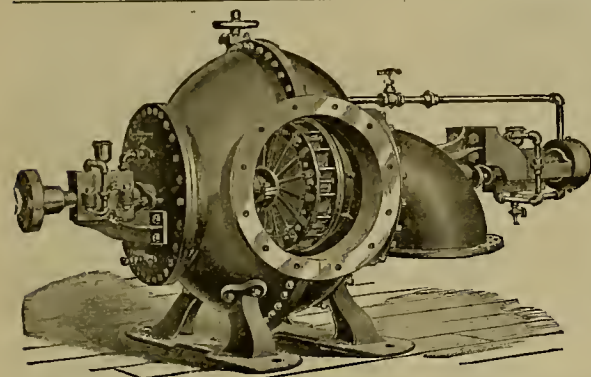
NEW YORK OFFICE: Room 43, No. 2 Wall Street.

DENVER OFFICE: No. 248 Eighteenth Street, Denver, Colorado.

MEXICO OFFICE: No. 11 Calle de Juarez, Chihuahua, Mexico.

UTAH OFFICE—SALT LAKE CITY, UTAH.

## JAMES LEFFEL'S Mining Turbine Water Wheel.



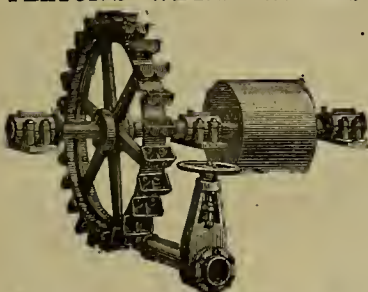
These Wheels are designed for all purposes where limited quantities of water and high heads are utilized, and are guaranteed to give more power with less water than any other wheel made. Being placed on horizontal shaft, the power is transmitted direct to shafting by belts, dispensing with gearing. Estimates furnished on application for wheels specially built and adapted in capacity to suit any particular case. Further information can be obtained of this form of construction, as well as the ordinary Vertical Turbines for Wooden Penstocks and in Iron Globe Cases, free of cost, by applying to the manufacturers.

JAMES LEFFEL & CO., Springfield, Ohio, or 110 Liberty St., New York.

FRASER & CHALMERS, General Agents, Chicago, Ill., and Denver, Col.

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## PELTON'S WATER WHEEL.



THIS WAS ONE OF THE FOUR WHEELS TESTED by the Idaho Company at Grass Valley, Cal., and gave 90 per cent., distancing all competitors. Send for Circulars and guaranteed estimates.

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## WINCHESTER HOUSE,

44 Third Street, San Francisco, Cal.

This Fire-proof Brick Building is centrally located, in the healthiest part of the city, only a half block from the Grand and Palace Hotels, and close to all Steamboat and Railroad Offices.

Laundry Free for the use of Families HOT AND COLD BATHS FREE.

Terms, Board and Room, \$1.00 per Day And upward.

ROOMS WITH OR WITHOUT BOARD. FREE COACH TO THE HOUSE J. POOLEY.

## A Treatise on the Horse and his Diseases

By B. J. KENDALL, M. D.



35 Fine Engravings showing the positions and actions of sick horses. Gives the cause, symptoms and best treatment of diseases. Has a table giving the doses, effects and antidotes of all the principal medicines used for the horse, and a few pages on the action and uses of medicines. Rules for telling the age of a horse, with a fine engraving showing the appearance of the teeth at each year. It is printed on fine paper and has nearly 100 pages, 7x5 inches. Price, only 25 cents, or five for \$1, on receipt of which we will send by mail to any address. DEWEY & CO., 220 Market St., S. F.

## THE GIANT POWDER COMPANY

Manufacture Three Kinds of Powder, which are acknowledged by all the Great Chemists of the World as

The Safest and Strongest High Explosives in the Market.

GIANT POWDER or DYNAMITE, Of Different Strengths as Required.

NOBEL'S EXPLOSIVE GELATINE," which contains 94 per cent of Nitro-Glycerine, and GELATINE-DYNAMITE, Stronger than Dynamite and even Safer in Handling.

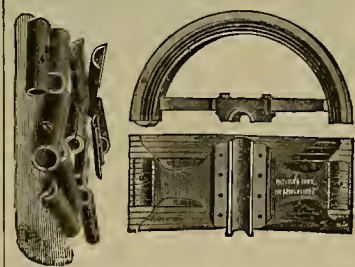
JUDSON POWDER IMPROVED.

FOR RAILROADS AND LAND CLEARING. Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

BANDMANN, NIELSEN & CO.,

CAPS and FUSE for Sale.

GENERAL AGENTS, SAN FRANCISCO CAL.



## THE DODGE PATENT "INDEPENDENCE"

Wood Separable or Split Pulleys POSSESS THE BEST BELT SURFACE.

—ARE THE—

Lightest, Strongest, Best Balanced and Most Convenient Pulleys made in the World. Entirely New and Original. Adapted to any Power Required.

JOHN SIMONDS, Pacific Coast Agent, 509 to 513 Mission St., San Francisco, Cal. Price List and Catalogue Mailed Free.

## THOMAS PRICE'S ASSAY OFFICE, CHEMICAL LABORATORY,

BULLION ROOMS and ORE FLOORS,

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COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed of in the Open Market to the Highest Bidder.

## Metallurgy and Ores.

**SELBY SMELTING and LEAD CO.** 416 Montgomery St., San Francisco.

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Highest Prices Paid for Gold, Silver and Lead Ores and Sulphurets.

...MANUFACTURERS OF...  
BLUESTONE, LEAD PIPE, SHEET LEAD, SHOT, Etc., Etc.

ALSO MANUFACTURERS OF  
Standard Shot-Gun Cartridges, Under Chamberlin Patent.

## JOHN TAYLOR & CO.,

IMPORTERS AND DEALERS IN

ASSAYERS' MATERIALS, MINE AND MILL SUPPLIES,

CHEMICAL APPARATUS and CHEMICALS, DRUG GISTS' GLASSWARE and SUNDRIES, ETC.

114-118 Pine Street, - San Francisco.

We would call the attention of Assayers, Chemists Mining Companies, Milling Companies, Prospectors, etc. to our full stock of Balances, Furnaces, Muffles, Crucibles, Scorifiers, etc., including, also, a full stock of Chemicals.

Having been engaged in furnishing these supplies since the first discovery of mines on the Pacific Coast, we feel confident from our experience we can well suit the demand for these goods, both as to quality and price. Our New Illustrated Catalogue, with prices, will be sent on application.

Our Gold and Silver Tables, showing the value per ounce Troy at different degrees of fineness, and valuable tables for computation of assays in grains and grammes, will be sent free upon application. Agents for the Patent Plumbago Crucible Co., London, England. Also for E. G. DENNISTON'S Silver Plated Amalgam Plates. The plates of this well-known manufacturer are thoroughly reliable, and full weight of Silver guaranteed. Orders taken at his lowest prices.

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## Nevada Metallurgical Works.

NO. 23 STEVENSON STREET,

Near First and Market Streets, S. F.

C. A. LUCKHARDT, Manager. ESTABLISHED 1886

Ores worked by any Process. Ores Sampled. Assaying in all its Branches. Analyses of Ores, Minerals, Waters, etc. Working Tests (practical) Made. Plans and Specifications furnished for the most suitable Process for Working Ores. Special attention paid to Examinations Mines; Plans and Reports furnished. C. A. LUCKHARDT & CO., (Formerly Hubb & Luckhardt, Mining Engineers and Metallurgists.

J. KUSTEL. H. KUSTEL. **METALLURGICAL WORKS.** 318 Pine St. (Basement, Corner of Leidesdorff Street, - SAN FRANCISCO

Ores Sampled and Assayed, and Tests made by my Process. Assaying and Analysis of Ores, Minerals and Waters. Mines Examined and Reported on. Practical Instruction given Treating Ores by Improved processes. G. KUSTEL & CO., Mining Engineers and Metallurgists.

## GO TO American Exchange Hotel,



The above Hotel is situated in the midst of the Banking and Commercial Houses of the city, and is by far the most home-like and desirable Hotel to stop at. O.H.A.S. & WM. MONTGOMERY, Prop'rs.

## THE RUSSELL PROCESS COMP'Y.

C. A. STETEFELDT, President.

NEW YORK OFFICE, 18 BROADWAY Room 709.

Rates \$1, \$1.25 & \$1.50 per day. Free Coach.



## Origin of Some Ancient Ditches.

EDITORS PRESS:—It appears from a recent statement in a San Bernardino paper that H. J. Stevenson, surveyor of the Palm Valley Water Co., while running a canal line south-easterly from the Agua Caliente Springs, came across what he supposed to be the remains of an ancient ditch, which he followed up for about a mile. The fact that large trees had grown up in this depression denoted for it a considerable age, the discoverer believing its origin to be pre-historic if not of antediluvian times. A little experience I once had in finds of that kind would cause me to accept this ditch theory with caution were I again to encounter that class of remains.

Returning in the summer of 1864 from Arizona, I came into California by way of the Mohave desert. Striking across and keeping along its southwestern border, I entered a long, narrow stretch of interval land known as Chicopolas valley. Traveling up this valley, which is separated from the Sahara by a low range of hills, I had the curiosity to ascend these hills in order to get a view of the country beyond. Striking along their westerly slope I noticed a singular depression, which, from its size and the regularity with which it held its course, running parallel with the longitudinal axis of the range, I concluded must be the remains of an ancient ditch. This trench, which on top varied in width from 10 to 30 feet, and in depth from 6 or 8 to 20 feet, held its course as far as could be seen.

While this seemed to be the work of human hands, and, if so, must have been intended for the conveyance of water, I could not see whence the water could have been obtained for filling it, there being no lakes or considerable streams in that section of country. Still, impressed with the idea that it must have been built for irrigating purposes, I kept a sharp lookout as I traveled up the valley for some evidence of former cultivation, but could find none. No mound, fragment of pottery or other relic tending to show that the place had ever been the abode of other than the present Indian race, could be seen. More than once during the day I ascended the hillside to see if the ditch was still there, as always I found it was.

By sundown I reached a ranch, where I tarried over night. Haunted by this ditch specter, I related to my host the discovery I had made, thinking it would be new to him, which, however, it was not. He knew all about it—knew when and how it was made—was, in fact, thoroughly posted as to its cause and genesis. "Seven or eight years ago," said he, "there occurred a very severe earthquake in this section of California. It opened a long and deep fissure in the earth, which, starting several miles to the west of this place, extended far to the southeast. Passing close by the house we are in, it shattered it badly, throwing down the upper story and killing one of the inmates, the wife of the owner. It was this rent you saw to-day and mistook for a ditch, as others have done before you." After what the man told me I abandoned this purpose I had formed of preparing for publication an article descriptive of my grand discovery and which I had fondly hoped would establish my reputation as an archaeologist.

As stated at the outset, this Chicopolas experience has taught me to go slow on the ancient ditch proposition, and had I been the finder of these Agua Caliente remains, knowing what a success the earthquake had shown itself to be as a ditch-digger, I would have been likely to attribute them to that rather than to human agency, looking about the while to see where in such excessively dry country enough water could have been obtained to fill so large a channel.

HENRY DEGRUIT.

San Francisco, Jan. 23, 1888.

## Coal Mine Explosion.

An explosion occurred in pit No. 5 of the Wellington colliery, British Columbia, on Tuesday, and sixty-eight miners were killed. The cause of the explosion has not yet been ascertained. A dense mass of smoke and dust was thrown from the shaft. Though a portion of the fanhouse had been destroyed, Manager Bryden immediately proceeded to the shaft and attention was first paid to repairing the fanhouse, which was quickly accomplished and the fan started again.

The shaft timbers were destroyed and the cages could not be used, but a pulley and rope were immediately prepared. Meanwhile the first man to come out of the pit had climbed by means of the cage wire cable through the shattered timbers to within 100 feet of the top, when a rope was lowered to him and he reached the surface in an exhausted condition. A second miner was also enabled to get by this perilous method to earth. It is reported that a third, when 50 feet from the top, loosed his hold and fell to certain death at the bottom of the shaft. Two men were then lowered as a search party and returned, stating that nothing could be heard but calls from below.

Fortunately the mine had not been fired, so danger from this source was averted. A temporary cage was made and lowered to a considerable depth, the miners reaching it by means of ladders, and at one o'clock, 103 of the 160 men in the mine had been rescued.

The explosion took place in the last level, and

in this 25 white miners were imprisoned, and fears that they were all killed were verified later, for at five o'clock all were carried to this surface dead and the work of taking out the Chinese began.

## Mining Share Market.

The fact that stocks still continue depressed and inactive does not seem to worry the mining community on the Comstock. Up there they do not pay so much attention to "stocks" as formerly, and pay more attention to mines.

The Virginia Enterprise makes the sensible statement that "so far as the business interests of our community and the welfare of our miners are concerned, things go on as well here under a depressed state of the stock market as under a booming condition of things, and so long as extensive hoards of pay ore exist in our mines, our own solidity and permanency are assured. Operators in San Francisco may contend for this or that point, and hull or bear this or that stock, but all we want here is to see the mines worked, ore taken out and the mills run.

"That this will be done for an indefinite period every assurance is given. The ore reserves in Con. Cal. and Virginia seem simply inexhaustible. Ophir bids fair to have a big slice of that business. Hale and Norcross is in every sense of the term a first-class mine. Savage has ore enough in sight to run for years. Chollar and Potosi have immense resources that can and will be made to yield a profit above expenses. Yellow Jacket, Confidence and Challenge are all first-rate paying properties and will soon forge to the front. Crown Point, Belcher and Segregated Belcher are far from exhausted properties and will soon open the eyes of speculators. Alta has plenty of good ore and a mill. The Silver City mines are all paying properties. Our milling facilities, owing to the heavy fall of snow this past winter, promise to be first class for the next 12 months, and there will be an immense amount of work done in that time. Finally, don't forget that there will be glorious opportunities to make money in stocks are long—and to lose it, too."

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PAWL AND RATCHET MECHANISM.—Richard J. Ballew, Mgalia, Butte Co., assignor of one-third to Samuel Stevens and John W. Hall. No. 376,467. Dated Jan. 17, 1888. This invention relates to the class of steam-engines, and it consists of a novel connection between the piston-rod and the driving-shaft, whereby the dead center is obviated and the rotation of the shaft is continuous. The first claim of the patent is as follows: "In combination with a reciprocating piston-rod and a driving-shaft, a double-faced ratchet upon said shaft, the teeth on said faces being reversed. Oppositely-extending cranks pivoted upon the shaft and carrying pawls for engaging oppositely each face of the ratchet mechanism for moving said pawls so as to throw one set into engagement with one face of the ratchet, and the other set out of engagement with this other face of the ratchet, to reverse the motion of the driving-shaft and connecting-rods between the cranks and the head of the piston-rod."

CHIMNEYS.—Benjamin F. Hentzel, S. F. No. 376,478. Dated Jan. 17, 1888. This is an improved chimney of that class which are made of terra-cotta or other pipes having an exterior casing with an air space between the two. It consists of an improved construction of the interior sections and the manner of connecting them with the joint rings so as to hold them firmly and make tight joints, and in the elastic springs attached to said joint rings, whereby the space between the chimney proper and the outer surrounding tube is maintained, together with a means for making a joint between said tube and the base or cap.

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco: PACIFIC LIVE STOCK CO., Jan. 19. Capital stock \$1,000,000. Directors—N. H. A. Mason, J. Leroy Nickel, J. H. Bolton, Henry Miller and Chas. Z. Merritt.

WOODBURY OIL CO., Jan. 24. Object, to deal in oils, varnishes, and lubricants of all kinds. Capital stock \$100,000. Directors—Chas. J. Woodbury, Geo. J. Ainsworth, S. T. Alexander, Geo. T. Hawley, and N. W. Spaulding.

THE LOS ANGELES PAPERS announce that the "second payments" on lands bought on credit there last summer, which some correspondent of an Eastern paper predicted would knock the bottom out of the boom, have all been made, and the boom never felt the shock.

THE FIRST PAPER-MILL in the American colonies was built in 1690, by William Rittenhouse, at Germantown, Pa. Ten years later this mill was carried away by a freshet, and the stone mill erected in its stead soon after continued to manufacture paper until 1798.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

## ASSESSMENTS.

COMPANY.	LOCATION.	No. AMT. LEVIED.	DELINQ'T.	SALE.	SECRETARY.	PLACE OF BUSINESS.	
Alpha Con M Co.	Nebraska.	1.	25, Jan 9.	Feb 15.	Mar 6.	C. E. Elliott.	369 Montgomery St.
Blue Lakes Water Co.	California.	1.	1,000, Dec 12.	Jan 20.	Feb 14.	R. N. Van Brunt.	318 Pine St.
Belle Isle M Co.	Nebraska.	11.	15, Dec 14.	Jan 17.	Feb 7.	J. W. Pew.	310 Pine St.
Best & Belcher M Co.	Nebraska.	33.	50, Jan 4.	Feb 9.	Mar 2.	L. O. Osborn.	309 Montgomery St.
Baker Divide M Co.	California.	15.	25, Jan 7.	Feb 13.	Mar 29.	D. M. Kent.	320 Pine St.
Crown Point G & S M Co.	Nebraska.	48.	50, Jan 4.	Feb 8.	Mar 29.	J. Newlands.	329 Pine St.
Chollar M Co.	Nebraska.	21.	50, Dec 5.	Jan 10.	Jan 31.	C. E. Elliott.	369 Montgomery St.
Commonwealth Con M Co.	Nebraska.	28.	50, Dec 21.	Feb 6.	Mar 28.	H. Deas.	309 Montgomery St.
Champion M Co.	Nebraska.	28.	10, Dec 12.	Jan 14.	Feb 2.	T. Wetzel.	522 Montgomery St.
Comet Con M Co.	California.	4.	3,000, Jan 6.	Feb 17.	Mar 14.	H. Lacy.	324 California St.
Eva Con M Co.	Nebraska.	1.	65, Jan 5.	Feb 10.	Mar 5.	J. Stadfeld Jr.	309 Montgomery St.
Found Treasure M Co.	Nebraska.	1.	66, Nov 5.	Dec 10.	Dec 30.	J. Stadfeld Jr.	419 California St.
Flowers M Co.	Nebraska.	5.	20, Jan 13.	Feb 17.	Mar 9.	L. P. Holden.	113 Leidesdorf St.
Gray Eagle M Co.	California.	5.	14, Jan 4.	Feb 10.	Mar 3.	T. Wezel.	522 Montgomery St.
Genesee M Co.	Nebraska.	1.	03, Jan 10.	Feb 14.	Mar 6.	E. F. Stone.	306 Pine St.
Heath M Co.	Idaho.	2.	05, Nov 4.	Dec 10.	Dec 30.	W. L. Oliver.	528 Montgomery St.
Iowa M Co.	Nebraska.	18.	25, Dec 21.	Jan 24.	Feb 11.	O. E. Higgins.	408 California St.
Kosuth M Co.	Nebraska.	9.	10, Nov 23.	Jan 5.	Feb 6.	C. C. Sturtevant.	309 Montgomery St.
Live Oak Drift M Co.	California.	7.	05, Dec 12.	Jan 16.	Feb 4.	T. Wetzel.	522 Montgomery St.
Mayflower G M Co.	California.	40.	50, Jan 19.	Feb 23.	Mar 16.	J. Morizo.	328 Montgomery St.
Mexican G & S M Co.	Nebraska.	35.	25, Jan 17.	Feb 21.	Mar 13.	C. E. Elliot.	309 Montgomery St.
Occidental M Co.	Nebraska.	7.	10, Dec 18.	Jan 24.	Feb 31.	J. Crockett.	310 Pine St.
Monarch M Co.	California.	25.	50, Dec 20.	Jan 24.	Feb 28.	G. W. Sessions.	309 Montgomery St.
North Bonanza M Co.	Nebraska.	8.	15, Jan 10.	Feb 15.	Mar 14.	J. J. Scoville.	309 Montgomery St.
Navajo M Co.	Nebraska.	18.	35, Jan 10.	Feb 14.	Mar 6.	J. W. Pew.	310 Pine St.
Nevada Queen M Co.	Nebraska.	3.	50, Dec 18.	Jan 24.	Feb 15.	H. Deas.	309 Montgomery St.
Occidental M Co.	Nebraska.	1.	10, Dec 18.	Jan 24.	Feb 31.	J. Crockett.	310 Pine St.
Quartz Mt G M Co.	California.	20.	70, Jan 17.	Feb 20.	Mar 15.	E. Hestres.	317 Sansone St.
Sierra Nevada M Co.	Nebraska.	90.	25, Dec 7.	Jan 11.	Jan 30.	E. L. Parker.	309 Montgomery St.
Spring Valley G M Co.	California.	2.	50, Jan 11.	Feb 13.	Mar 18.	H. Pichor.	320 Sansone St.
Utah Con M Co.	Nebraska.	3.	25, Dec 13.	Jan 17.	Feb 3.	A. H. Fish.	309 Montgomery St.

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE
Belcher S M Co.	Nebraska.	J. Crockett.	327 Pine St.	Annual.	Jan 31
Gibbs Creek M Co.	Nebraska.	L. Osborn.	309 Montgomery St.	Annual.	Feb 6
San Francisco Con M Co.	Nebraska.	H. Deas.	309 Montgomery St.	Special.	Jan 28
Manhattan S M Co.	Nebraska.	J. Crockett.	327 Pine St.	Annual.	Feb 1
William Penn M Co.	Nebraska.	J. J. Scoville.	309 Montgomery St.	Annual.	Feb 7

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE.
Con California & Va M Co.	Nebraska.	A. W. Havens.	309 Montgomery St.	50.	Jan 10
Eureka Con M Co.	Nebraska.	H. R. P. Hutton.	306 Pine St.	25.	Feb 3
North Belle Isle M Co.	Nebraska.	J. W. Pew.	310 Pine St.	50.	Feb 2
Musall Junction & M Co.	California.	J. Morizo.	328 Montgomery St.	05.	Sept 17
San Francisco Con M Co.	California.	F. Berier.	320 Sansone St.	05.	Sept 12
Standard Con M Co.	California.	J. W. Pew.	310 Pine St.	05.	Jan 12

## San Francisco Metal Market.

WHOLESALE.

THURSDAY, Jan. 26, 1888.	
ANTIMONY—French Star.	94 @
BORAX—Hannay.	71 @ 72
Powdered.	71 @ 72
Concentrated.	62 @ 71
COPPER—	
Bolt.	26 @ 30
Sheeting.	16 @ 25
Ingot.	25 @ 26
Flue.	25 @ 26
IRON—Glenbrook ton.	— @ 30 00
Eglington, ton.	— @ 28 00
American Soft, No. 1, ton.	— @ 35 00
Oregon Pig, ton.	21 00 @ 23 00
Clay Lane White.	22 50 @
Shot, No. 1.	31 00 @
LEAD—Pig.	5 00 @
Bar.	5 25 @
Sheet.	5 30 @
Shot, 3 lb. can.	Drop, 3 lb. bag.
Buck, 3 lb. bag.	2 00 @
Ohlled, do.	2 20 @
STEEL—English, lb.	16 @ 25
Black Diamond, ordinary sizes.	— @ 25
Flue.	4 @ 5
Machinery.	4 @ 5
Naylor & Co.	10 @ 16
TINPLATE—Coke.	5 75 @ 6 00
Charcoal.	6 @ 7 25
QUICKSILVER—The Standard.	43 00 @ 50 00
Flasks, new.	1 05 @
Flasks, old.	85 @

## New York Metal Market.

Telegraphic advices dated Jan. 26th give the following New York prices:

BAR SILVER—90 3/4 per oz.	
BORAX—94 @ 95.	
COPPER-LAKE—\$16.40 @ 16 45.	
IRON—No. 1, \$22 00.	
LEAD—\$4 1/2 @.	
TIN—\$36.50.	

The following is the latest by mail from the "New York Metal Exchange Market Report":  
Copper—European, spot closing at \$16.90 @ 17.10. Transferable Notices (Lake) issued at \$16.90 @.

LEAD—Quiet at \$4.85 @ 4.95 spot. Transferable Notices issued at \$5.00.  
TIN—Weak at \$36.00 @ 37.10. Transferable notices issued at \$34.00.

MARBLE PRICES—At tidewater. 100-ton lots of listed irons (when brand is specified) range nominally about as follows: Lich, Grade No. 1, \$20.50 @ 21.00; No. 2, \$19.50 @ 20.00; Grey Forge, \$17.00 @ 17.50; Hudson River, Grade No. 1, \$20.50 @ 21.00; No. 2, \$19.50 @ 20.00; Grey Forge, \$17.50 @ 18.00; Southern, Grade No. 1, \$20.00 @ 21.00; No. 2, \$19.50 @ 20.00; Grey Forge, \$17.00 @ 17.50.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, \$37.00 @ 37.50; Bliton Tin, \$37.00 @ 37.50; Banca Tin, \$37.00 @ 37.50; Baltimore Copper, \$14.00 @ 15.40; Orford Copper, \$15.25 @ 16.50; P. S. C. Copper, @ 16.00; Foreign Lead, \$5.40 @ 5.60; Foreign Spelter, \$6.10 @ 6.30; Antimony, \$11.75 @ 15.00.

## THE PIONEER MINERS.—The First Annual

Meeting of the Pioneer Miners' Association of California was held at rooms 37 and 39, Phelan building, last week, for the election of officers. The following-named gentlemen were elected officers for the year ensuing: Dr. I. S. Titus, president; vice-presidents—J. C. Broderick, C. P. Rutherford and W. T. Gibbs; J. G. Lawton, secretary; J. L. Halstead, treasurer; E. L. Willard, marshal; directors—J. C. Fruchey, T. C. Hoopes, S. A. West, T. R. Smith, J. Follansbee, G. E. Sherwood and I. S. Cannon. The time for holding the regular meetings for the transaction of business was changed from the first Monday to the first Thursday of each month.

THE PHOENIX Herald says: "There is no mistaking the richness of the placer diggings in the districts of La Paz and Ehrenberg, Arizona, on the Colorado river, but the scarcity of water renders the working of them almost an impossibility."

A BILL has been introduced in the Washington Territory Legislature to abolish the use of seals on legal documents.

A COOS BAY paper says ducks became so tame during the cold weather that there was no sport in shooting them.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Jan. 5.	WEEK ENDING Jan. 12.	WEEK ENDING Jan. 19.	WEEK ENDING Jan. 26.
Alpha.	1.50	1.55	1.35	1.65
Andes.	1.75	2.40	2.00	2.00
Argenta.	1.20	1.40	1.25	1.15
Belcher.	6.75	6.00	6.75	5.50
Best & Belcher.	6.75	6.00	6.75	5.50
Bullion.	1.80	1.90	1.65	1.65
Baltimore.	1.95	1.00	1.90	1.80
Bodie.	2.70	2.80	2.70	2.45
Benton.	2.55	2.55	2.55	2.55
Bodie Tunnel.	3.00	3.00	3.00	3.00
Bulwer.	3.00	3.00	3.00	3.00
Cal. & Va.	2.20	2.50	2.20	2.20
Challenge.	6.00	6.75	6.75	6.50
Champion.	6.00	6.75	6.75	6.50
Chollar.	6.00	6.75	6.75	6.50
Confidence.	9.00	9.00	9.00	9.00
Con. Cal. & Va.	4.00	4.50	4.00	4.00
Caledonia.	4.00	4.50	4.00	4.00
Con. Pacific.	7.00	7.75	7.50	7.10
Crown Point.	7.00	7.75	7.50	7.10
Crocker.	8.00	8.00	8.00	8.00
Crown Point.	8.00	8.00	8.00	8.00
Dudley.	8.00	8.00	8.00	8.00
East B. & B.	5.50	6.00	5.50	5.50
Eureka Con.	5.50	6.00	5.50	5.50
Exchange.	1.05	1.20	1.05	1.15
Gold & Curry.	4.70	5.25	4.75	4.80
Hale & Norcross.	10	12	11	12
Holmes.	12	12	12	12
Independence.	1.00	1.00	1.00	1.00
Low.	1.00	1.00	1.00	1.00
Julia.	5.00	5.00	5.00	5.00
Justice.	1.15	1.00	1.05	1.00
Kentuck.	2.00	2.00	2.00	2.00
Low Wash.	4.00	4.00	4.00	4.00
Martin White.	1.50	1.60	1.40	1.50
Mono.	1.50	1.60	1.40	1.50
Mexican.	4.90	5.25	4.90	4.75
Mt. Diablo.	1.00	1.00	1.00	1.00
Northern Belle.	8.00	8.00	8.00	8.00
North Belle Isle.	7.50	8.25	8.25	8.40
Niagara.	2.20	2.30	2.20	2.40
Nev. Queen.	2.20	2.30	2.20	2.40
North B. & B.	1.40	2.25	1.25	1.50
Occidental.	1.40	2.25	1.25	1.50
Ophir.	1.25	1.00	1.25	1.00
Overman.	1.70	2.00	1.60	1.90
Potosi.	5.25	6.00	6.00	5.50
Portland.	1.00	1.00	1.00	1.00
Peer.	1.00	1.00	1.00	1.00
P. Sheridan.	1.00	1.00	1.00	1.00
Silver Star.	7.25	8.50	7.00	7.25
Savage.	7.25	8.50	7.00	7.25
Sec. Bond.	1.00	1.00	1.00	1.00
Sierra Nevada.	4.45	4.75	4.30	4.70
Silver Hill.	4.00	4.00	4.00	4.00
Silver King.	4.00	4.00	4.00	4.00
Scorpion.	1.00	1.00	1.00	1.00
Union Con.	4.50	4.80	4.30	4.50
Utah.	1.45	1.75	1.40	1.70
Yellow Jacket.	5.25	6.00	5.50	5.80

## Sales at San Francisco



**THE FREIGHT BLOCKADE.**—Nearly 2000 freight cars are said to be blockaded on the lines of the Union and Central Pacific, and Denver & Rio Grande railroads. On Monday and Tuesday of this week about 250 freight-cars arrived here over the Central Pacific railroad, and that road is getting every engine it can obtain from other lines to move the enormous amount of merchandise which is reported to be pressing in at the farther end of the route in volume quite equal to that now discharging at San Francisco.

**ANTI-ADULTERATION.**—The National Board of Trade, at its recent conference in Washington, reaffirmed its action regarding the necessity of a judicious national anti-adulteration law. The question of spurious lard, submitted by the Chicago Board of Trade, was discussed, and a resolution was adopted petitioning Congress to enact a law providing that all packages containing impure or spurious lard shall be so plainly labeled as to avoid deception.

**TRUST ABUSES BEFORE CONGRESS.**—Mason's bill providing for the investigation of trusts and combinations was taken up by the House Committee on Manufactures Jan. 20th, and a favorable report was ordered. It is expected the report will be made early next week, and will recommend that a committee be authorized to investigate all trusts affecting coal, sugar, mining industries and other kindred subjects.

#### Complimentary Samples.

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JOHN G. H. LAMPADES—San Benito Co.  
G. W. INGALLS—Arizona Territory.  
WM. WILKINSON—San Joaquin and Stanislaus Co.'s.  
A. F. JEWETT—Tulare Co.  
E. H. SCHAEFFLE—El Dorado and Amador Co.'s.  
C. E. WILLIAMS—Yuba and Sutter Co.'s.  
R. G. HUSTON—Montana Territory.

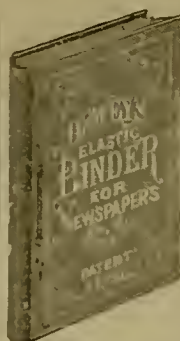
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THERE are evidences of a mining revival in Arizona.

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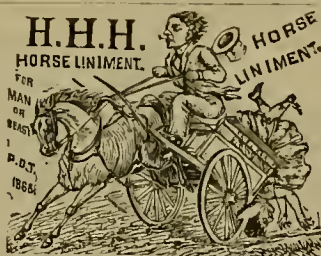
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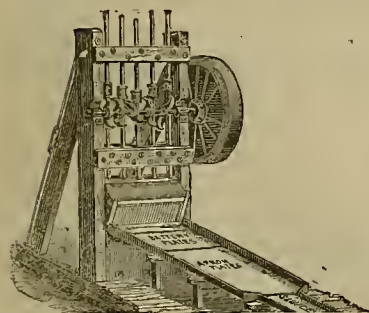
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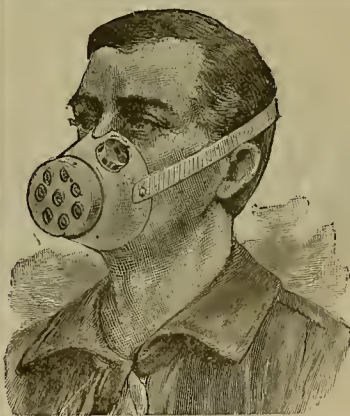
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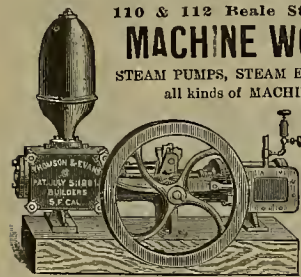
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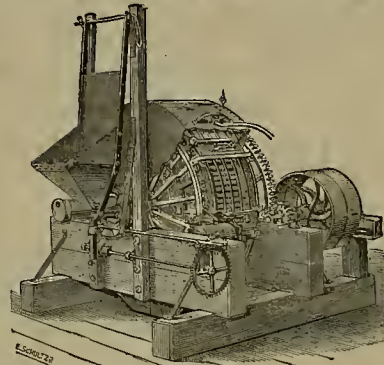
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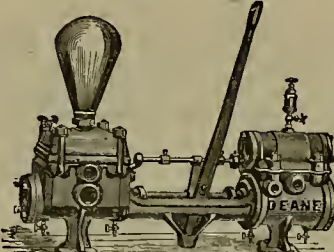
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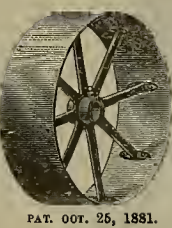
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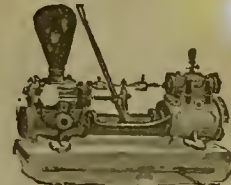


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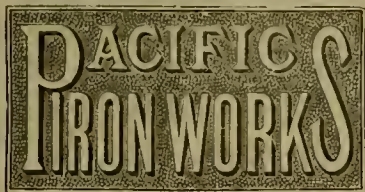


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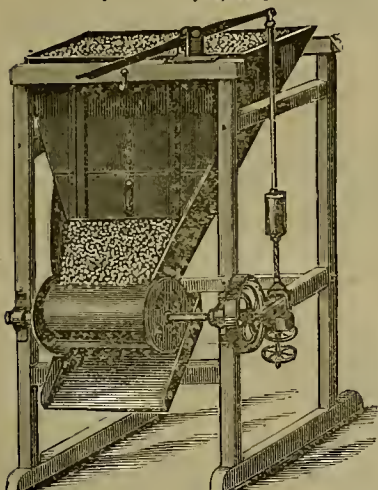
Spring Valley Water Works, S. F.	1 200 H. P.	Starr & Co. Mills, Wheatport.	1 100 H. P.	San Jose & Santa Clara Electric R. R. Company	1 100 H. P.
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California Cotton Mills, East Oakland.	1 150 H. P.	Selby Smelting Works, Vallejo Junction.	1 75 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
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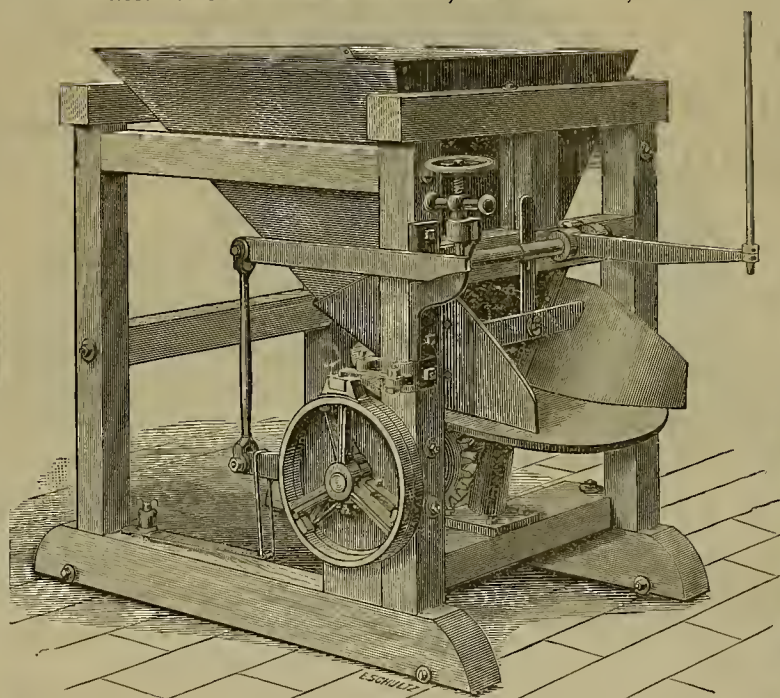
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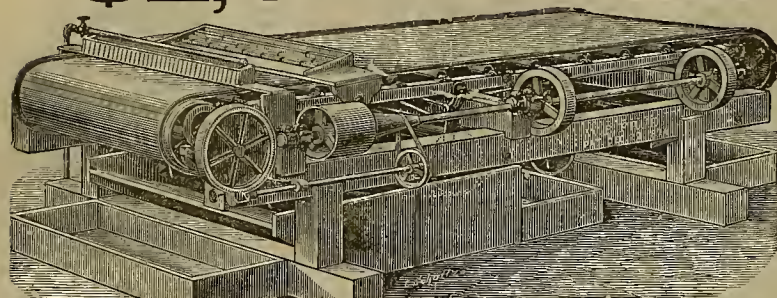
THE MONTANA COMPANY (Limited).

N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

ADAMS & CARTER.

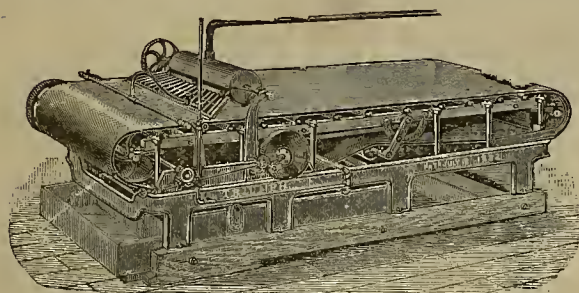
Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

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THE  
"TRIUMPH" ORE CONCENTRATOR.

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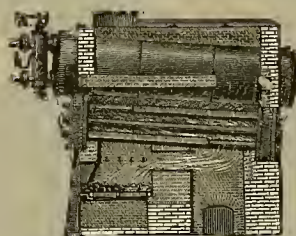
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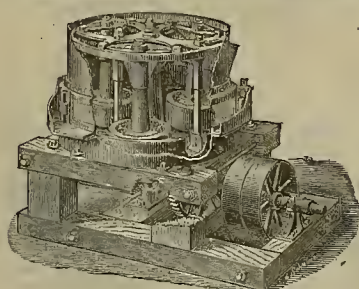
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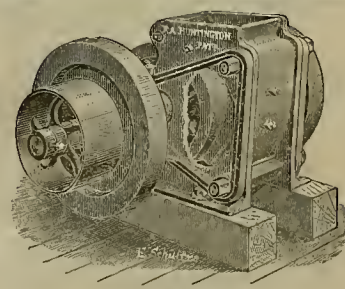


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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

ANNUAL MINING REVIEW---TWENTY PAGES.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, FEBRUARY 4, 1888.

VOLUME LV.  
Number 5.

## Wall's Crushing Rolls.

We give on this page engravings of the "Cyclone Crusher," better known as the Wall Crushing Rolls, a device for crushing ore which is now attracting considerable attention from mining men by reason of the work it is accomplishing where in use. It is stated that the constant grinding and rubbing to which all material is subjected in being reduced by the common Cornish rolls and similar devices, and the consequent production of "slimes," is wholly avoided in this crusher. The application of a direct crushing force in this machine secures the material to any degree of fineness, producing a uniform granular pulp, which is essential to the successful treatment of ores by any process of concentration or lixiviation.

E. A. Wall, the patentee of the machine, says: "It differs from the Cornish and other roller crushers in common use, chiefly in the novel construction and arrangement of the crushing faces, which consist of series of parallel corrugations, extending across the face of the shells, either parallel or inclined to their axis, the corrugations being rounded or curved with such proportions, that when intermeshed and rotated, every portion of the surface of each will press equally upon the counterparts of the opposite roller, and being held firmly in position by suitable steel gear, skipping of the crushing faces upon each other, or upon the material being crushed, is rendered impossible.

"By reference to illustration, Fig. 2, it will be seen that the meeting or crushing faces, present at all times overlapping curved surfaces, between which the material is firmly held, and crushed by almost direct pressure, thus absolutely avoiding the 'grinding' or uneven and rapid wear of the face of the shell, and the consequent destruction of the ores by the production of refractory 'slimes,' such as result to a disastrous degree from the constant grinding or rubbing to which all material is subjected in being reduced by the common, plain-faced roll, attrition mills, and similar devices in common use.

"For pan or plate amalgamation, three pairs of these rolls will give a greater daily product than a battery of 40 stamps, requiring not to exceed one-fifth the driving power, and costing in original outlay less than one-fifth, while the cost in repair incident to unavoidable wear and tear will be but a mere fraction of the stamp battery.

"To illustrate more fully the difference in principle upon which this crusher operates, as compared with the common Cornish rolls, attrition-mills and like devices, and also to indicate the cause of the extraordinary power and durability of the machine, the fact is submitted that the crushing by this machine is the result of almost direct pressure, or, more strictly, a

direct blow, it being impossible for the ores to slip from the grasp of the machine, or for the crushing faces to slip upon themselves. The effect upon the crusher, as well as upon the ores, may appropriately be compared to the breaking of ores by hand with a hammer, as,



Fig. 2—THE WALL ROLLS.

grinding away a portion of the face of the rollers in the form of annular grooves, destroying utility as a crusher before one-fifth of the shell has been worn away.

At Silver Reef, Utah, with the sandstone ores the Wall rolls have been very successful.



Fig. 3—THE CORNISH ROLLS.

for instance, a hammer weighing four pounds, with careful usage, would probably serve to crush a hundred tons of hard quartz sufficiently fine to pass a 40-mesh screen, producing a gran-

ular pulp entirely free from refractory slimes, whereas a few hours' application of the same hammer to the face of a revolving grindstone would convert the entire hammer into a slime which would resist the most approved methods of concentration."

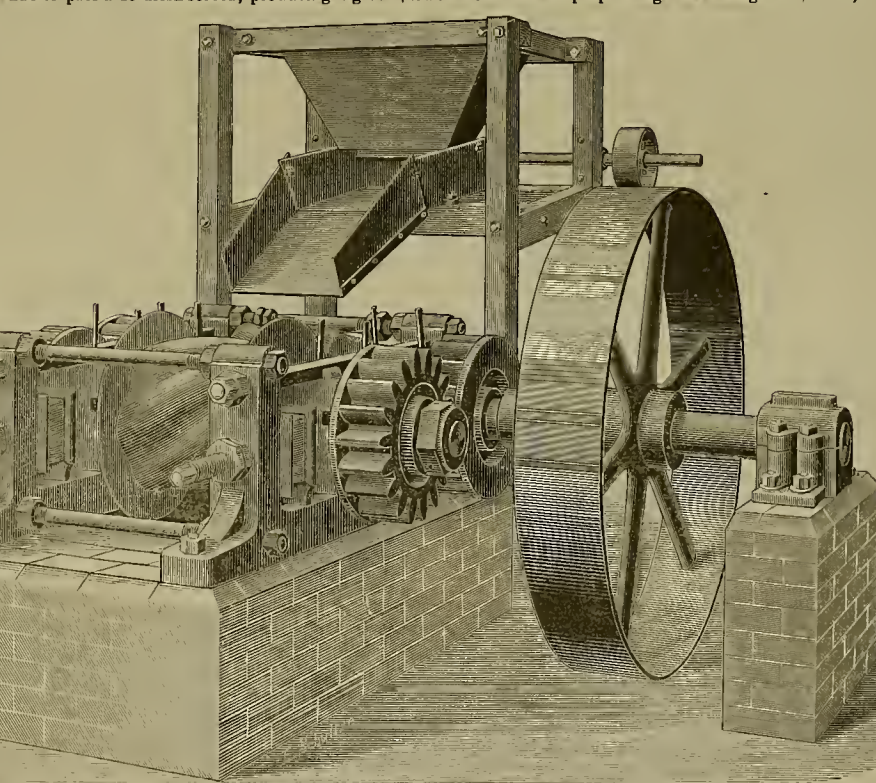


Fig. 1—THE CYCLONE QUARTZ CRUSHER.

Fig. 3 illustrates the application of crushing force in the common plain-faced or Cornish rolls. It will be seen that the pressure is applied at right-angles to a line drawn from the axis of the roller to the point of contact with the ore upon the periphery of the shell, or about 60 degrees from direct pressure, the inevitable result is the "grinding" of a portion of every piece of ore that passes these rollers into an impalpable slime, the ores at the same time

pass a 60-mesh, yet the finest particles are granular and absolutely free from slimes. It was found that the Wall rolls crushed five times as much ore as the Cornish rolls formerly in use, while requiring 40 per cent less steam.

The concentrating works at Milford, Utah, found the Wall rolls greatly superior to any other form of roller crushers. These rolls are also in use at the sampling works at Park City, Utah, and the sampling works at Salt Lake City, where they are giving satisfaction. Two sets have been sent to the tin concentrating plant of the Mount Eurowrie Iron Co., Barrier Ranges, New South Wales; two sets of the Barrier Ranges Concentrating Co's silver and

lead concentrator, N. S. W.; two sets to Tooth & Co., Maryborough, Queensland, for the Mount Perry gold mine. The ore in this last named mine is claimed to be of the same character as that of the celebrated Mount Morgan mine, near Rockhampton, Queensland. A set has also been purchased by the Australian Smelting and Reduction Co., Dry Creek, Adelaide, South Australia; and one by the Broken Hill Co., Broken Hill, N. S. W. There are numbers in use in Montana and Utah. Parke & Lacy are the Pacific Coast agents for this machine, and they report that the Wall rolls are being rapidly introduced in all directions in the mining regions.

## Capital in Mining.

In glancing over the mining-field of this country, it is perfectly apparent that those regions which have had the most assistance from capital of late years are the greatest producers. Take, for instance, Colorado and Montana,

which head the list now in the matter of bullion production.

They are both very prosperous from a mining point of view, and they are the two regions which have been best backed up by capital. Butte had the advantage of having very good men to give it a start, and very good mines, too, for that matter. But none of the mines were developed to any great degree until capital took hold of them. It takes money to make money in mining as in other thiogs.

Colorado, being comparatively near the Eastern centers of capital, has had great assistance, and its mines are doing wonderfully well.

Arizona, New Mexico, Oregon, Nevada, Washington and even California have not for a long time enjoyed the advent of any large capital for investments in mines. They have had to get along as best they can.

Of course in time all this will be remedied. Mining is now considered more of a legitimate business than formerly, when all mining investments were considered speculations. "Stock board" mining is in decadence in these days. People are going into

mining for the mines themselves, and it is a good thing to do, for there is plenty of room for investments of this kind.

DURING 1887 63 mining companies in the United States paid \$10,515,752 in dividends, which is a quarter of a million dollars more than was paid the previous year. The dividends paid in 1887 amount to \$2,050,084 more than were paid in 1885, and to \$1,210,029 more than were paid in 1884. The amount of dividends that will be paid in 1888 will be much greater than ever before in the history of mining in the United States. Reports in regard to the present condition of the leading mines on the Pacific Coast indicate this.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—EDS.

## Mines at Grass Valley.

## Advantage of Publishing Mining Information.

EDITORS PRESS:—There is no industry more deserving of encouragement than mining, and in view of this fact it is the duty of the local press in mining districts to devote more or less time and space to the legitimate and unexaggerated representation of all properties under development in localities where they are published. Frequently, when questioned in regard to this matter, publishers are inclined to the opinion that such action would simply be local and become in time monotonous to the readers of their paper. This idea is unjust and also ridiculous. Such articles in one sense are local, but they are not barricaded and kept within the limitations of a mineral district. They are carried from one journal to another, and in this manner are scattered broadcast over the land and never fail to come under the observation of mining men. In every mining camp properties are operated by poor men who are not able to give them that systematic development that usually brings success, or to air their operations before the world. Such men are benefited by

## Newspaper Representation

Of their mines; they appreciate the interest thus manifested in their affairs and are also encouraged by them. Districts that have been long worked are more likely to be neglected in this respect than new and booming camps, while in reality they are the very ones to encourage, particularly where merit can be found. In California, and indeed in every State and Territory in the Far West, many old but still valuable mining camps are passing out of notice, owing to the fact that no one takes sufficient interest in them to write them up.

There is no question in the world but that many promising mineral fields have been virtually ruined by inexperience and a total lack of mining ability, camps that should be prosperous and heavy bullion-producers to-day. In early days relationship was a superintendent's recommendation, and many of those who were induced at that time to enlist in mining have good reasons to regret that there was ever such a relation as nephew, son or uncle. Such failures were not only ruinous to parties directly interested, but disastrous to the section in which they were operating. Again, districts can be found that have been worked almost exclusively by miners whose only capital consisted of energy and confidence. Such districts are more frequently found in the gold belts along the Pacific Slope, and the properties only worked to a water level, or what would more naturally be termed, "surface worked."

Grass Valley is, without any doubt, one of the

## Oldest Gold-Bearing Quartz Camps

In California, and has long been noted for its heavy gold product, and also for the high grade of the precious metals extracted. This camp justly comes under the category of surface-worked mining districts, though it can boast of some of the deeper developed exclusively gold-producing quartz mines in the world. This camp affords the best illustration of the idea your correspondent desires to convey, and the past history of this fabulous gold-bearing section is only a repetition of that of other mineral districts that have passed through a long season of quietude, only to be brought to the front again as booming, dividend-paying mining fields. In early days, as was then the custom, all locations made in this district were square, and the veins having a heavy "dip" soon passed from the original location to the one adjoining, and the result was that after the original claim was worked out but little work was prosecuted in adjoining ground on account of water and the inability of miners, owing to impecuniosity, to purchase machinery requisite for draining purposes. Of course, in some instances the work of development was continued in the face of all difficulties, but these were exceptions and not the rule.

## A Large Number of Locations

Were made and universally by poor men who could continue delving as long as no capital but muscle was required; but the moment water was tapped operations were suspended never to be renewed until men of means could be induced to take hold of such properties and explore them. As a general thing all such claims were rich on the surface, and this portion of the ground was gonged and worked in any manner that would not incur a heavy expenditure, and after the surface body was extracted no effort was made by the operators to search for anything deeper in the ground. Grass Valley, though never considered at any time in its history as a worked-out camp, has passed under a cloud and witnessed for a time a steady decline, only to experience a spasmodic lease of life, and thus it exists to-day. Though the pick and drill have been employed here for more than a generation past, and acres of ground have been torn from the underground workings of the mines and millions of dollars dragged from the

rockbound coffers of the earth, Grass Valley is to-day, without any exaggeration, the

## Richest Gold Quartz District

On the Pacific Slope. The development of this great quartz-field is, comparatively speaking, only in its infancy. But very few compared with the large number of its promising prospects have ever received such development as would bring them under the classification of mines. Scientific surface-readers are not the kind of experts to judge mining districts. The hammer and drill, well backed, are the only experts on which we can safely rely. They do the work and do it satisfactorily. This is what this district requires and what it will ultimately receive. Such opportunities as are here presented to mining men may be ignored for a time, but the day will come when every one of them will be greedily sought after, and a general revival will take place all along the line. Those who have watched the ups and downs of the old camp have never lost confidence and are universal in the opinion that brighter days are in store for them.

## The Formation of the District

Is slate, and is generally considered fine breaking ground, though occasionally hard bars are encountered that retard progress, but such obstacles are not of long duration. The veins are not large, but are well defined, existing between smooth, handsome walls, and are assuredly permanent. Those who are familiar with the cost of extracting and milling the ores say that where water-power is employed, in both instances, rock yielding only \$5 per ton can be worked profitably, remarkably close work considering the size of the veins. The Idaho, North Star, Empire and other prominent mines are employing a large force of men and are all yielding well. Many other minor properties are being operated by local syndicates, all of which appear to be taking out their share of the precious stuff. Several new companies will be operating next season, and a number of transfers of property are pending. The closing down of the hydraulic mines was a severe blow to Grass Valley, as well as the mining interests of the State; but now that a reaction has taken place in quartz mining this section will be in a measure indemnified by the losses thus sustained.

## Prospecting is Going On

All over the district, and the prevailing opinion is that next season will be a very propitious one and the output of gold largely increased. Wet weather will retard for awhile the surface work on some of the properties, but this of course will be only temporary. The camp is on the line of the Nevada City Narrow Gauge railroad, in the very heart of a fine timber district, and water can be obtained on many locations for power purposes. Taken altogether, Grass Valley is most advantageously situated as a mining district, and those who are desirous of investing in gold-producing properties could not become identified with a richer or more promising mineral field. The climate, though perhaps a little rigorous, is extremely healthy, and snow never falls to a depth to interfere with teaming or other necessary outdoor work. Railroad tariff is light, and prices generally are low. Wages are three dollars per day in the mines and all other labor in proportion. The town of Grass Valley is substantially built, beautifully situated, and is a business place of some note. Religious and other public institutions are among the permanent features of the place, while a perfect, well-regulated school system is the proud boast of its people. In some future communication a more minute and explicit account of the mines will be given to your readers, coupled with the earlier history of this district, reminiscences, etc.

R. C. G.

## Los Angeles County Mines.

## San Gabriel Canyon.

EDITORS PRESS:—I have not noticed in any of your issues any reference to the mining operations now going on in the above canyon, so I herewith give you a few particulars. There is now an English company called the Victoria Mining Company, making large developments about five miles up the canyon and close to the old Zipata mines. This company commenced operations last September, and have now about 40 men employed. Already a tunnel has been run to a length of 250 feet. In this distance two large lodes of mineral have been cut through, giving exceedingly satisfactory assays varying from 67 to 191 ounces per ton. An air shaft has been sent to a depth of 50 feet, right on top of a large lode. The mineral obtained gives equally satisfactory results. This shaft is sunk with the intention of connecting with the tunnel. The water-wheel to drive the machinery is already in position.

It is intended to erect a 100-stamp mill in sections of 20 stamps. I was shown round the works by the resident engineer, W. E. Defty, a clever and courteous young Englishman, who pointed out the large outcroppings of immense width. Everything is going on in a most business-like manner, and there is every prospect of a large and successful development. The greatest surprise is that those large veins were not discovered and worked before.

It is anticipated that the mill will be in full operation within four months, although the rainy season is now somewhat stopping progress

of outside work. The operations of this company will no doubt lend a great impetus to the welfare of the district. It is to be wished every success.

Already some mining has been done up this canyon with poor results, owing to bad management. At the old Winston mine they actually cut through a large ledge of rich ore and left it behind them, although the outcroppings of this lead stand out most prominent. I am also given to understand that another English company is going to commence operations somewhere in the same canyon. T. L. K.

## Silver Creek Mining District.

EDITORS PRESS:—Situated in the heart of the Blue Mountain range in Eastern Oregon and on the headwaters of Powder and John Day's rivers, is the young and promising Silver Creek mining district. Of the mineral resources of this district little has been said or is known except by the few prospectors who are the original discoverers and explorers. The district is, in the near future, destined to become one among the leading gold and silver-producing centers of the Northwest. These few prospectors have for many years past been diligently and earnestly toiling away exploring the rivers that contain the treasure vaults of old mother earth until mines of great magnitude and richness have been exposed to view.

These prospects when discovered by the adventurous prospectors were found to be partially developed by the action of nature, leaving but little, comparatively speaking, to be done by the hand of man to prove the permanency and richness of further explorations. Now that these prospectors have discovered, explored and developed, and proven beyond a doubt the existence of strong, well-defined true fissure veins of ores containing the precious metals, they have done well their part. In fact they have done all that could be required of them. Now they await the willing hand of capital to assist them in extracting and converting the crude ore from the mine into bullion. Following is a brief description of an occasional one of the more developed of these properties, which will give to the reader a fair idea of the existing condition. Among the most thoroughly developed prospects might be mentioned the La Bellevue, Wide West, Ajax, Red Cloud, California, Imperial, Silver Star, Winchester, Grey Eagle, Silver Peak, Herculean, Excelsior, Eureka, and many others too numerous to mention, all of which have been opened up into mines of merit. The La Bellevue has been constantly worked by the Cahell Bros., who are the original discoverers. For several years from this mine nearly 150 tons of high-grade gold and silver ore has been shipped to Denver for treatment, yielding \$200 to \$330 per ton.

There is no scarcity of this ore, as the vein has been explored at various places and at considerable depth for the distance of 6000 feet, showing several chimneys of rich ore, from 50 to 250 feet in length, and 3 to 8 feet in width between walls. The largest and richest ore body yet encountered in this mine was struck only a few days ago. The La Bellevue promises to be a bonanza unequalled in the Western mining fields.

Three miles eastward from the above described mine is situated the Cable Cove group of mines. In this group are located as many as a dozen adjoining claims, which are now sufficiently developed to output immense quantities of rich gold and silver ore. Included within this group is the California mine, which has been developed by nearly 700 feet of levels, showing a continuous ore chimney, 800 feet in length, with an average width of 22 inches, the average assay value of which is \$45 per ton. This mine is capable of producing 75 tons of ore daily. Twelve tons of assorted ore, recently shipped to Denver for treatment, yielded \$107 per ton. Included in this group are several other similar mines with a considerable amount of exploring done on them. Among these may be mentioned the Herculean mine, which is a very large ledge of sulphureted quartz rich in gold. The choice of these mines described as being in the Cable Cove group can be purchased at prices ranging from \$4000 to \$20,000. I will venture to say that no better opportunity was ever offered for the investment of capital in a mining enterprise. As to facilities for working these properties and treating the ores, nothing is lacking. Forests of the choicest of timber abound everywhere, water-power is unlimited, a climate unequalled in any mountainous region, first-class roads, and everything desirable for successfully and profitably working the mines and treating the ores. As space will not admit of further description of the mines, facilities for working, etc., I will inform you further in the future. D. C. PROBASCO.

AN AMERICAN CUTLERY MANUFACTORY IN SHEFFIELD.—A singular instance of American business pluck is afforded by a St. Louis man, A. J. Jordan, who has established a large cutlery manufactory right under the nose of the most formidable rivals he could possibly have—in Sheffield, England. He declares his intention of producing wares of as fine a quality as any in the world, and is not daunted by the gloomy prophecies which are made regarding his venture. If he succeeds, it will be a notable triumph of Yankee audacity and technical skill.

## Pine Grove, Amador County.

EDITORS PRESS:—Considerable interest has been manifested in this section the past year. As it is not on the famous mother lode, it has been represented more than once as being worthless, being simply in granite, and the ledges small. Therefore, special attention was given in our visit to a number of mines. Located as it is about eight miles northeast of Jackson, it is in a part of the county abounding in timber and water, as both the Amador and McLaughlan canals pass through this section.

## Placer Mining

Is carried on to some extent, the largest claim being that owned by the McLaughlan estate, Mr. L. McLean, agent, which comprises about 500 acres. It is and has been in successful operation for some years. They employ a number of men, and though they have to buy their water to hydraulic, their cleanups are always satisfactory. Further up Grass Valley creek even richer ground is worked.

The Pine Grove placer mines are now ready for work and only stop work when short of sufficient water. All of these claims when worked systematically are satisfactory. This has been the case for the past three years or more. The mines do not come under the debris violation, as the industrious Italian catches the debris to make the richest of vegetable and garden land.

## Quartz.

The Vandermandt mine, running parallel with Grass Valley creek, is a very prosperous claim and deserves the attention of capital. The ledge is of good size. It assays as high as \$40, with eight per cent sulphurets of iron and galena, and carries some silver.

The Dane mine has been a successful mine and largely prospected. It owns a 10-stamp mill, with concentrators, which does custom work when not running on their own rock.

The Clough, formerly known as the Craft, has a large vein, carrying some free gold and a large percentage in sulphurets, it milling from \$6.50 up. It has a slate footwall with a good gouge that will pay to work.

The Manzanita, owned by Messrs. Wheeler & Bradshaw, has resumed work on the tunnel that cuts the ledge on which they will drift north-west and southeast. The tunnel is in 175 feet and strikes the ore body 80 feet below the surface. The ore mills about \$9.50.

The Climax, owned by Messrs. Reed and Askey, has, no doubt, the richest ore in the county and as rich as any in the State. A box on exhibition at the Lode fair showed jewelry quartz that would make Col. A. Andrews smile. In development a tunnel was run to cut the ledge 80 feet where the ledge is about six feet wide in granite and bird's-eye porphyry; then 130 feet south, the ore varying from two to six feet the whole distance. There are also two shafts on the ledge, 50 and 60 feet, with a drift of 150 feet in the north, from which very rich ore has been extracted.

Fully 150 tons of rock on the dump is ready for their five-stamp mill and will make a return of not less than \$23. With other prospecting this claim has been opened 900 feet and is a bonanza to own and work.

Extracting, milling, and hauling costs \$2.50, leaving a handsome result that can be increased by a mill on the ground.

Two other properties that should have the attention of persons who desire valuable investments are those owned by Eli Gardner, and formerly by San Francisco parties who became disgusted or dissatisfied in their partnership, commencing in a quarrel and ending by losing their property. The property has one shaft 260 feet with levels at the bottom. In the north drift, at about 80 feet from the shaft, the crosscut meets 22 feet in width of good milling rock, about seven feet of which is ribbon rock. There is another shaft 200 feet with drifts, and all in good shape to open with proper machinery. In a large number of pans of dirt there were very few but returned good results. The ledge can be traced for a distance in granite and porphyry. It carries a good percentage of galena and iron sulphurets which should be of high grade.

Some Italians in the same vicinity have finished crushing about 40 tons with very satisfactory results. Messrs. Ratto, Spagnoli and McKenzie Bros. have very prosperous prospects.

Besides mining, Pine Grove has its claims as

## An Agricultural Section.

The finest of fruits and in great variety is grown on the ranches of Gardner, McFarland, Griffin, M. M. Nichols, Renhart and Dan McKay. This past fall it was not unusual to see as many as 16 to 20 poles as props to keep the trees from breaking—apples, plums, peaches, prunes, cherries, berries of all kinds, grapes and even tropical fruits are grown.

The town is prettily situated and well named, the immediate population being about 150. There is a fine hotel kept by Mr. S. W. Emmons. During the summer months the town is a lively place, as the lumber and timber teams are passing all times of the day. Mr. I. T. Wheeler has a well-stocked general merchandise store where miner and logger can find supplies. There is also a good blacksmith-shop owned by Mr. I. I. Williams, who seldom has leisure even in winter.

This section should attract attention as a health resort of medium altitude, with the finest of scenery and water. INDEX.



## Calaveras County Mines.

## Murphys.

EDITORS PRESS:—The leading mines in this section are those operated by the Willard Mining Co., being galena and gray copper-bearing quartz in limestone formation. These mines have been worked by different companies for many years past, the rebellious character of the ore making their working a matter of great difficulty and expense. The present company deserve success for the outlay and persistence that have characterized their operations. Rumor has it that if the ore in the main shaft continues good to a reasonable depth, a tunnel will be driven to strike the leads at a considerable depth, and mining operations on an extensive scale will be inaugurated. On this same belt a mile further east Messrs. Stone & Moss have been quietly but energetically pushing developments on their mines. The veins average two feet in width, carrying gold and silver in a free state and in gray copper and galena. As the ores run from \$80 to \$150 a ton, they have every reason to stay by it. South of Murphys are the hydraulic mines of McCormick & Bisbee, being the old Central Hill claim. With the present low rate of mining labor, this abandoned claim is netting its owners more than it did its first locators in the fifties. West of the town the hills are riddled with gold-bearing quartz veins, the major portion of which have been opened to a depth of 10 to 50 feet by Murphys' most persistent and deserving prospector, Sublett. All of these locations could be tapped at a depth of 500 feet by a tunnel, and in consequence offer a field for capital seldom equaled, as the leads all show gold and are seldom more than 50 feet apart, with the rock running \$5 to \$15 a ton on the surface. At present Cory & Matheson are driving a tunnel to strike the Beatrice—a four-foot ledge, and will get in by spring. This ledge was abandoned by Sublett at 50 feet in depth, but the present company at 100 feet, struck ore assaying in the hundreds. Further west on the same lead, Sublett is driving a tunnel for capitalists, and will undoubtedly show up a valuable property. All this section wants is to be bottomed. All of the prospecting heretofore has been superficial in its character, and in consequence, unsatisfactory in results. Southeast lies the old placer town of

## Douglas Flat.

The bottoms and sidehills have been given up to agriculture, but the old miners stick to their old channels with a zeal worthy of success. To the east, Shannon has opened up a fine-looking lead of pay gravel, while west, Allen Thomas has reached the channel in his long tunnel and has every prospect of being well paid for his years of toil. Pray and Chase are working into the hill in the face of great difficulties; but should they combine with the Central Hill Co. will yet have a most valuable property. At Vallecito but little is being done. Capitalists have endeavored from time to time to secure the gravel deposits extending from this point to Murphys and tap bedrock by a tunnel; but the dog in the manger policy of some of the owners has thus far prevented it. Once this project is carried out, a property will be shown having few equals in the State, as the deposit is deep, several miles in length and rich in pay.

## Angala.

This town has passed the prospecting stage and entered into a permanent prosperous era. The ore bodies, at a depth of 200 feet, show both size and value. In consequence, this once abandoned camp is dotted over with new mills, all producing, and by their number supplying the extensive chlorination works of Messrs. Bland & Greyson, at this place, with a steady supply of concentrated sulphurets rich in gold. No camp in the county is as far advanced or safely anchored in quartz mining as Angala.

## Indian Creek.

North of Murphys, is enjoying a healthy mining experience. The Emmeralda is showing up very rich and other localities in the immediate vicinity promise equally well. Cunliff & Diver are working along steadily on their mines, proving their character and netting a good return for themselves. The mines of Mr. James Taylor in this vicinity are idle for want of capital, but will well repay the developer. On the north is the old Calaveras mine now under bond to Messrs. Haggin & Hearst. Their operations here are but a duplicate of everything they undertake. The Burleighs are boring away for the 500-foot level, while each 100 feet has its levels being driven; if it is a mine they will know it beyond a doubt, and once the fact is proven the Calaveras will be put in condition to be worked for all there is in it. The fact that the ore of this mine was rich from the surface and that Haggin & Hearst upon Mr. Hearst's examination are putting in a year's solid work on it, goes far to assure its being in the near future a good property. On the Stanislaus river, east of Murphys, Tom Goodwin (Genial Tom) is showing what luck and capital will do. All of the mines were abandoned or closed down in this section, the miners fearing to spoil them by further prospecting. Goodwin with his pluck and luck has by a small amount of work proved these veins to be both permanent and valuable, and his prospects look very flattering.

## Sheep Ranch.

This town is the child of the Sheep Ranch mine, owned by Mr. J. B. Haggis. Under the efficient superintendency of that practical

miner, Mr. W. H. Clary, the property has paid steadily year after year. The main shaft has just been retimbered and everything points to a still greater degree of success. As the shaft is now on its way to the 1100 foot level, there can be no doubt as to the permanency of the leads in this section.

## El Dorado.

Everything is quiet in quartz here, though one man has a number of fine prospects in the neighborhood which he proposes to develop. Railroad Flat is flat. The hydraulic claims are enjoined, and in quartz there is but little doing.

## West Point.

A new life has been infused into this old camp, which promises to outlive in size and permanency its former prosperity. The Lockwood, with its eight foot ledge of \$80 to \$800 rock, has forced itself upon the attention of mining men, and those that have thrown their prejudices aside and invested here have no reason to regret it. Messrs. Page, Rickett & Moore have secured a number of valuable properties which, at 200 feet, show a two-foot lead of ore running from \$40 up. The town wears an old-time aspect, with saloons predominating and a good hotel badly needed.

## Mokelumna Hill.

The principal mining operation in this section is the Tiger, owned by the Ilex Gold Mining Co., and superintended by Mr. Courties of Detroit. This English company has, through their efficient superintendent, erected a class of improvements seldom found on any mining property. The handsome residence of the superintendent, boarding-houses and dormitories for the employees are complete in every detail, and the fortunate miner can enjoy all the comforts of a first-class hotel at the cost of the ordinary kennel-like accommodations furnished by most mines. The work, however, is not confined to the surface, but for a depth of 300 feet and a length of 1200, the mine has been thoroughly prospected, and in consequence of the excellent showing, the necessary reduction works will soon be erected. The gold-bearing cement mines in this section are proving a bonanza to their fortunate owners.

## San Andrae.

The Union Gold Mining Co. is putting down its main shaft, and getting in shape to realize large returns. This—an English company—believes in doing what it undertakes thoroughly, realizing in the end much more than our dividends to-day, developments tomorrow, miners.

Taking Calaveras county as a whole, few counties offer as good a field for legitimate, practical, profitable quartz mining.

E. H. SCHAEFFLE.

## Sparta Mines, Oregon.

EDITORS PRESS:—General activity prevails in mining circles throughout this district, and the amount of ore hoisted gives confidence to those who are half inclined to doubt the existence of the rich quartz mines so numerous here. Until the past season, the only process of getting the values was by very imperfect assays, and the thousands of tons of ore worked at a profit is convincing evidence of the true value of these ores when properly treated, not only saving all the free gold, but the gold value in the sulphurets. The ten stamps at Hoggm are running day and night on good ore, and the result is very satisfactory to the owners. The 20 stamps on the Whitman at Cornucopia have shut down after a 26-days' run, showing a cleanup of \$65,480, or \$41.50 to the ton in gold. Large forces of men are at work on the Whitman and Red Jacket, and when the ore bins are full the mill will start for a 90-days' run. Al Waldran is working a force of men at the Gray Eagle, taking out a high-grade, free gold ore, which will be treated by the arrastra.

Major Wilkenson is working his Blue Gulch mine and is showing some very rich free gold ore, the gangue yielding as much as \$2.50 to the pan. Fate & Dennison are taking out very rich ore, the best being selected for shipment to Salt Lake City as soon as 20 tons are in sack.

The Sullivan mines, six miles north of Sparta, are likely to create a mining excitement at no distant day, as the report of Prof. Lewis shows 3,464,000 tons of ore in sight, and the result of 13 assays gives an average of \$17.81 to the ton, while the report says "more than 2,000,000 tons of the ore now in sight can be classed to run over \$40 to the ton in gold." The Sullivan mines are owned by parties here and in Chicago, and the company just organized with a capital of \$5,000,000 have placed 1,000,000 of its stock on the market, to be sold at 20 cents on the dollar, to secure capital to construct a 100-stamp mill, which will be run by water-power, the company owning the natural dam on Eagle creek, with an estimated 2000-horse power, situated less than half a mile from the center of the Sullivan group. The Arkansas Belle, owned by parties in Little Rock, Arkansas, is another big outcrop, and as these are smelting ores, it is believed the company will construct a smelter at an early day for the treatment of these ores. Reservoirs are being prepared and put in order for the free water, which promises to be more plentiful than for the past several years, and the owners of the many rich placers are getting ready for a big cleanup in the spring.

SILAS.

Sparta, Oregon, Jan. 10, 1888.

## A New Mining District in Montana.

[From our Correspondent, R. G. HESTON.]

The Orn Fino district in Deer Lodge county is just now attracting considerable attention, and justly, too. It is located on a direct line between the towns of Butte and Deer Lodge, and about equidistant, but will from natural causes be tributary to the latter place.

For several years more or less prospecting has been carried on here by Mose Menard, J. F. Fox, Franklin Stuart and others, but of a necessary development in this way was slow. Some two months ago Mose Menard, after investing about \$5000 in prospecting the Cottonwood, decided to incorporate it and let some of his neighbors in if it were a good thing, and if not, to let them bear part of the burden. This was done and a portion of the stock was laid aside for the payment of Menard for his claim, and a portion was floated for the purpose of development. Quite a fund for that purpose was raised. Mr. Menard had some very nice ore in his shaft, which was down 110 feet, and several crosscuts had been run, and in but a short time the whole of the stock for development was taken up by the residents of Deer Lodge and more was wanted.

Messrs. J. F. Fox and J. H. Mills at once supplied the want, and in the same manner placed the Mountain Lion on the market, and the development stock was placed within a few days. Active operations were commenced, with J. B. McMaster as a general manager for both prospects.

Cottonwood stock appreciated at once to three times its original cost, but it remained for the Mountain Lion to surprise them all.

A few days ago they out to the ledge in the tunnel and sent down some ore that was tested by Prof. Trshagen of the Montana College and H. S. Reid, and three tests went \$90, \$132 and \$787 per ton. Silver is predominant, but each assay showed gold. As a matter of fact, I presume all the stockholders in the Mountain Lion feel like prospective millionaires. The development is not extensive enough to determine the continuity of the ledge, but from the fact that it is traceable on the surface for a long distance and Messrs. Franklin & Co. have a shaft down on an extension and a tunnel run for some length on the vein and have good returns from assays made, it is certainly a promising outlook for the early opening of a lively camp.

There is quite a number of other locations near by. Messrs. Reed & Fox have the Banker lode, south of the Cottonwood mine. It is no uncommon thing for them to get 200 or 300 ounce ore. Ruby silver specimens are lying all over their dump. Nearly all the capital invested in the district is from Deer Lodge, and should it pan out in the future as it now gives fair promise to, it will lead to boom the old valley town.

Deer Lodge has been called upon to give up many of her leading citizens from time to time to build up and contribute to the prosperity of Butte and Anaconda. It is the hope of the writer that the tide may have reached the turning-point and that they may have to return the population again to the town that may be well called the educational center of Montana.

The mines are only eight miles from the Montana Union R. R. at Racetrack Station, and are located on Gospel mountain. Several gulches head up in this mountain that were placer-mined some 20 years ago. Among them were Independence and Boomerang. These, though both shallow, paid very handsomely in those times, but have long since been worked out and abandoned. With Mountain Lion shares at \$1 offered and no sellers, it shows the confidence the holders have in the outcome of their mine.

## Copper Smelting.

## Modern American Methode.

[Written for the PRESS.]

A work on copper smelting\* has recently been published which will be found a great use to mining engineers and copper miners. Copper mining in the United States has been developed along lines of progress quite widely divergent from those followed in Europe, until the treatment of copper ores here is as characteristically American as the treatment of gold ores.

No strikingly new principles of metallurgy have been developed in American copper smelting, but new and much improved methods of applying known principles have been discovered and worked out until American practice is in advance, and in some respects far in advance of the practice elsewhere, especially in application to American conditions of high cost of labor and material. And all that characterizes this advance is set forth by Dr. Peters in an unusually useful and available form.

The improvements have been made by a few able metallurgists, and among them and associated with them was Dr. Peters himself. The results of their work have heretofore been unheralded, and are here for the first time adequately presented.

No part of the treatise is taken up with geo-

\*Modern American Methods of Copper Smelting, by Edward D. Peters, M. E., M. D. Published by the Scientific Publishing Company, 37 Park Place, New York.

eral metallurgical principles such as belong to a work on general metallurgy; but it is packed full of available and helpful information, just such as a metallurgist needs when he turns to any particular branch of his profession, and much of this information applies to other branches than copper metallurgy.

Tables of costs, details of construction and manipulation and results of experience abound. In fact, the book consists of the notes of an able metallurgist, thoroughly trained in the general principles of his science and of large experience in the particular branch of which he treats.

That this is precisely the case the writer can state confidently, for on one occasion when it became necessary for him to learn the bearing of the very latest American improvements in treating copper ores upon the probable future cost of production at the great Butte copper lode, Dr. Peters, then in charge of the Parrott smelting works at Butte City, gave him all the required information out of the stores of his memory and his notes, and here in published form is almost the same presentation of the subject.

The information so liberally imparted from unpublished notes was very helpful and very warmly appreciated, and the same notes published will undoubtedly be widely and warmly welcomed and appreciated by metallurgists and others who take part in the great industry of copper production.

JAMES E. MILLS.

## Lead-Silver Smelting in Spain.

[Translated for the PRESS.]

In the *Berg und Huettenmaennische Zeitung* of 7th October is an article from the pen of A. Centner descriptive of the plant and operations of the "Compania Metalurgica," near Carthagena, from which the following is taken:

The greater part of the ore treated at these works is brought in by cart from the Fuensanta mine, the average monthly output being about 531 tons of galena, carrying 60 per cent lead and 21½ ounces silver per ton (2000 pounds). The gangue is quartzose and the lead contained in the ore is associated with arsenic and antimony. Fahlerz carrying 40 per cent lead and 54½ ounces silver is also received at the works from the Coto Fortuna, and other ores with from 40 to 50 per cent lead and from 9 to 145½ ounces silver per ton are brought in by water from the Sierra Almagrera. Spathe iron poor in silver brought from Parazuelos and the neighborhood of Carthagena is used for fluxing purposes. The fuel used comes from England. Most of these ores are cained before being sent to the blast furnaces, only a small proportion, those rich in silver and poor in lead, being charged in the raw state in small quantities. The lump ore is ground in a pulverizer before roasting.

The preparatory roasting is carried on in long, one-hearth reverberatory furnaces (fortebau-felungsoefen). Although the company have six of these, only three or four are in operation at the same time, the others being either held in reserve or undergoing repairs.

These calciners are 49' 3" long and 11' 5" broad, external measurements, and eight men put through about 7½ tons of ore in 24 hours, using 1½ tons of coal.

These calciners stand campaigns of from two to four months. The smelting plants proper consist of two round water-jacketed furnaces; height 10' 9"; width at tuyeres 4' 11", and eight tuyeres each. Only one of these furnaces is in use.

The smelting charge is made up as follows:

	Per cent
Roasted ore .....	33
Iron ore (30-40 per cent Fe) .....	12
Iron slag .....	6
Lead slag .....	38
Lime rock (carries some lead and silver) .....	6
Total .....	100

In addition to the above a little rich silver ore poor in lead is charged in amounts conforming with the supply on hand. The charge is made up so that the least bullion shall contain something over 64 ounces per ton in order to time the London market.

Five men are employed around each furnace, one of whom attends to the charging while the other four perform all the remainder of the work. The shifts are 12 hours.

About 15.43 tons of lead bullion are produced every 24 hours with a consumption of 6.6 tons of coke. The bullion is tapped from the crucible every five hours, while the slag runs continuously and carries from one-half to two per cent of lead. The bullion is shipped to London and sold as such.

A hydraulic lift built in between the two furnaces is employed to elevate charges to the feed floor. Two force pumps supply the necessary water pressure for the accumulator of this lift.

Blast is supplied by Root blowers. Two boilers each with two flues and a heating surface of from 969 to 1076 square feet supply the steam-power with a consumption of 1.06 tons of coal each in 24 hours. Only one boiler is used, the other serving as a reserve. Two engines, one of 60-horse power, the other of 30, furnish the motive power. The smaller is only occasionally used to run the pulverizer.

Two pumps raise the necessary water supply for water jackets, condensers, boiler, etc., into a masonry reservoir.

W. L. AUSTIN.

Toston, Montana, Jan., 1888.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**AMADOR.**—*Ledger*, Jan. 28: Sinking of the large shaft at the Amador gold mine has been suspended for the lack of large square timbers. It is not probable that these can be had before spring; or at any rate until the roads admit of their being hauled from the mountains. There are plenty cut, we understand, but they cannot be hauled until dry weather comes. Fifteen men have been discharged on this account. There are only 8 or 10 men now employed about the mine. The sinking operations at the Zelle have been finished, and the full force of miners are again at work. The shaft was sunk to feet deeper—only two sets instead of four as it was removed. The mill has been overhauled during the spell of idleness, and is now pounding away at its wonted gait again. It has been definitely decided to put up a 50-stamp mill at the New London mine in the spring. There is some talk of the Moore mill being started up at an early date, to clean up the ore piles on the dump and at the mill. It is reported that a 20-stamp mill is to be erected on the Chicago mine, near Plymouth. The two-stamp mill at the Live Oak,  $2\frac{1}{2}$  miles west of Jackson, is at work on ore from the new shaft.

**PLYMOUTH.**—*Cor. Amador Dispatch*, Jan. 28: The Plymouth Consolidated mine has a fire in some of the lower levels that, it is feared, will do considerable damage. We hear that all the shafts at the mine are covered up close with dirt to smother out the fire. The men were taken out of the mines shortly after noon to-day, 24th, and it may be as much as a month before the fire is put out, just owing to how much start the fire has got in the timbers. The New Chicago is running night and day. They are taking out a lot of good rock, and will start a mill in a short time. The mine is being sunk at a rapid rate, and it will not be long before the 1000-foot level will be started. The superintendent feels very sanguine of developing one of the best mines on the mother lode. Mr. H. P. Gordon is very busy running his tunnel to strike the lead on his claim on Indian creek, north of town. Geo. Lamb and Wickum are busy on their claim, the War Eagle, and have discovered a very fine ledge of quartz that they say will pay well.

#### Calaveras.

**MURPHYS.**—*Cor. Angels Record*, Jan. 26: The last few days of thawing weather have cleaned the flume of ice, and plenty of water for all purposes is coursing through it, starting along its journey mine and mill and gravel claims; and it is to be hoped that the mining industry will not suffer from another cold snap during the winter, thus insuring a long and we hope successful run in all mining industries. The depth of snow in the mountains, which fell early in the winter, will insure a large water supply during the heated months of summer, when mines can be more advantageously worked. Milling and mining will be in active operation here during the middle of the present week, with better prospects of remunerative returns than usual.

**SHUT DOWN.**—The Calaveras mine, at Indian creek, has shut down.

**RESUMED.**—Work was resumed in the Utica mine last Saturday, having lain idle a week, owing to the recent cold weather.

#### El Dorado.

**SUPERIOR.**—*Placerville Democrat*, Jan. 27: The Superior, or old Reid mine, located about three miles from this city, and owned and operated by Dickerhoff & Goyan, will hereafter be run by water-power. Albert Jones having completed his contract for the necessary 5000 feet of pipe. The main shaft has been sunk to a depth of 200 feet, which is tapped by the upper tunnel at a depth of something over 150 feet. The new hoisting machinery will be set up in this tunnel, and the ore taken out through the shaft, it being a much cheaper process than the one heretofore adopted of hauling the ore to the mill from the mouth of the lower tunnel. Just as soon as the pipes can be laid and water turned on, a full force of men will be put to work, and this valuable property worked for all there is in it.

#### Inyo.

**LOOKOUT MINES.**—*Independent*, Jan. 28: Fitzgerald & Gunn have leased the Minietta mine to Clinton & McGovern for a term of six months. The lessees have already opened up a fine body of ore in what is known as the Coburn cut in the mine. They will soon be included in the list of shippers. They have five men employed. That portion of the Hearst mine known as the 300-foot ore body, in the main tunnel, has been leased by Fitzgerald to John Curran. Fitzgerald has leased the Lava Beds mine to Frank Cox for five months. Cox is working three men besides himself in the mine. On the first Monday of the present month Fitzgerald began sinking on one of his claims called the Kentuck. Eight days afterward the men were taking out two tons of ore each day. Three eight-hour shifts are now working, and with but two men on each shift the yield is three and a half tons daily. The average value of the ore is 88 ounces silver per ton and 58 per cent lead. A patent hoisting windlass is being put up and a track laid for the ore cars; when these improvements are completed the ore shipments will average about 20 tons each week. The Kentuck is in a very rough country; it cost Mr. Fitzgerald \$470 to make a trail 890 feet long to the mouth of the shaft. All the indications are favorable for finding a big ore body in the Kentuck mine.

#### Nevada.

**DEER CREEK.**—*Nevada Herald*, Jan. 24: The Champion mine is in working order now with brand-new hoisting works and mill, and everything in apple-pie order. The power is supplied by two Pelton water wheels. Geo. G. Allan furnished the company with a model ten-stamp mill and appliances, and it has been so provided that five more stamps can at any time be added. Jay Parsons superintended the putting in of the hoisting works and contractor Onstoft the mill—both first-class mechanics. Mr. John Vincent is the superintendent. John O'Donnel and George Allen are at the helm in the hoisting works. John McLaughlin is foreman. With this force and a good hoisting and milling outfit, the Champion ought to make a good showing.

They now have 150 tons of ore on the dump which is being crushed at the mill. There are 26 men in all at present employed at the mine. At the Merrifield there are 14 tributaries now at work, and the number will be increased this week. The prospects are good here. The North Merrifield has a ledge which averages five feet in width, the average yield of which is \$7 per ton. A tunnel is in 150 feet from the face, and at that point the ledge is seven feet in width, with well-defined walls which are lined with a clay gouge. There are only 30 feet of backs, however. There have been mined about 1500 tons of rock. Last year Mr. McCoy, the owner, selected rock from a portion of the ledge three feet in width, for a crushing, which yielded \$18 per ton. A small quantity of rock from this ledge was taken out a few years ago which paid \$52 per ton. At present the underground work is flooded with water which cannot be handled for want of machinery. The showing is first-class here for a good and permanent mine with the investment of capital. The Spanish mine is owned by the Spanish Gold Mining Co. A. R. and A. S. Lord are the principal owners. Its area is 600 by 1500 feet, with the exception of two small pieces which were bonded to parties owning adjoining claims. The claim is on the extension of the North Merrifield—both of which are situated about one-half mile from Nevada City, near the main traveled road and a few hundred feet from the Nevada City mine. The locality is favorable for driving machinery with water-power. Both claims are on the same fissure vein as the Providence and Merrifield. There being no machinery on the Spanish mine, most of the work thus far done has been through a tunnel 230 feet in length. There is also a shaft down 76 feet and a winze down 60 feet. There has been about 1000 tons of rock taken out of the Spanish, parts of which have been worked at different mills at different times, and the average yield has been \$10 per ton. North from this point on the same ledge about 500 feet distant is another pay shoot, which was discovered last year by some Spaniards. The ore was oxidized above the water level and was evidently very rich. Before it was found out these men were working there and before they were ordered away they panned out several hundred dollars. Before leaving they caved large boulders into the hole where they were working and filled it up. Although the owners have not been able as yet to open up this point, they have done enough work to satisfy them there is a valuable deposit of ore there. The tunnel has been timbered this year and a crosscut run in the way of development. Up the creek about 600 feet east of the Mountaineer is the Julia claim. It is owned by Philip Dunn. There is a tunnel on the mine 400 feet in length, about 300 feet of which has been run the past year. The tunnel is being run to reach a pay shoot which is known to exist about 200 feet further ahead. The shoot was explored on the croppings and the rock taken out paid \$13 per ton. The ledge was 18 inches wide and the rock is heavily sulphureted. The tunnel will give about 300 feet backs when completed. The ledge runs parallel with the Mountaineer and is a very good prospect. The Chapman Ranch mine is owned by Dr. Chapman of this city. The claim is 300 feet in length and is on the same vein as the Nevada City mine. The ledge is of good size, incased on one side with a granite footwall and the hanging being slate. Parties worked the ledge some years ago and obtained very good results. It is thought mismanagement was the cause of shutting down the property. They got a mill before they arranged for works with which to pump and hoist, so when they reached water level they were up a stump and of course had to quit. The doctor has never worked the property himself, but expects to do so at no distant day, and expects to open up a good mine. The Rockdale is a claim owned by Michael Cone and is situated on Rush creek, near Red hill. A shaft is down 25 feet. The ledge is about a foot wide and pays \$8 per ton. It is a contact vein, being between slate and granite. Works are going to be put up this spring and developments made.

**RANDOLPH FLAT.**—*Foothill Tidings*, Jan. 27: The blue gravel strike in the Pet Mining Co.'s claim at Randolph Flat has caused a ripple of excitement in mining circles. Cunningham, Jenkins & Co.'s success induced the organization of the Pet Co. and the bonding from Messrs. Diamond & Eberlein of Rough and Ready of the claim in question—comprising a fraction over 21 acres. Three miners have been at work not more than a month and in that time have sunk one shaft a depth of something more than 70 feet, and in this shaft and at this depth was the gravel bed discovered. At the time of our visit the shaft was in gravel about  $2\frac{1}{2}$  feet, and the appearance of the lead bettered with every inch of depth. Before gravel was found 22 feet of cement sand was penetrated. Of course the first foot of the bed, the top if you will, is full of small boulders and good-sized rocks, but from this point on the true gravel is found. Washings of cement from the rocks and boulders were made in a primitive manner and in all cases more or less "colors" were found. Water is now retarding work and it may be three days before bedrock is attained. Then the importance of the strike can be in a measure estimated. A two-inch pump will then be put in. One of the best gravel miners on the coast is interested and working in the adjoining claim. This is John Cunningham, and he advances the opinion that the strike in the Pet will prove as rich as in his claim, where an average of over 50c is obtained to the small windlass tubful. And the gravel is washed, not crushed, as its cement character demands, that full returns may be had. Properly worked, 75c per tubful is the least value set upon the gravel. Mr. Cunningham further says the best gravel found in his claim is on the side adjoining the Pet. The gravel channel as now indicated is most advantageously located for working. A very short branch brings water from the Excelsior ditch to Cunningham & Co., and a pressure of 115 feet is obtained. One of the shafts sunk by this company is used as a pump-shaft, and on this is a four-inch pump operated by a Pelton wheel. Water for all purposes costs the company less than \$1 per day. Should the Pet Co.'s lead prove remunerative, a tunnel will be run in on it, and below the tunnel a mill will be built. This tunnel will drain the neighboring country and operations will be conducted through it. At the proposed point for the mill a water pressure of over 250 feet can be had. For systematic, economical working, unexcelled advantages are at hand. Mellich & Co. are and have been working a claim in the immediate vicinity of the above mentioned for

some time and we understand they are doing well. It is believed the old and marvelously rich Randolph Flat lead has again been found, and should these predictions prove correct that section will again witness its pristine glory and Grass Valley will take another step in the ladder of prosperity. But a short period will suffice to determine the facts.

**WORKING ORES.**—*Transcript*, Jan. 28: The reduction works on the lower road between this city and Town Talk, established in 1858 by Oscar Maltman, the present proprietor, and Mr. Deekin, have been from time to time since then improved by additions and alterations to the buildings and machinery until they are to-day the completest and most effective works of the kind on the coast. They are now to be still further improved by the addition of first-class smelting works as thoroughly equipped for treating all kinds of ores found hereabout as any on the coast. There will also be built a mill of recent invention, having a capacity of crushing 25 tons of ore a day by the dry process. There is one of the kind decided upon now in use in Calaveras county, and it is an unqualified success. The machinery for the mill will be made at Geo. G. Allan's foundry in this city. The crushing, chlorine and smelting works will when completed give employment to 18 or 20 men. Teamsters hauling freight to the upper country will on their return trips bring down loads of ores from various mines whose product cannot be made profitable without the smelting process which has not before been available without going to the expense of shipping the ores to San Francisco. The building of the new smelting and crushing works will be commenced by Mr. Maltman as soon as the winter storms are over.

**THE TRUE FIGURES.**—*North San Juan Times*, Jan. 27: We learn from an authoritative source that the cleanup at the Delhi mine for the month of December was \$24,000—\$17,000 from the mine proper and \$7000 from the sulphurets. The batteries were not cleaned. The usual dividend of \$10,000 was declared and paid. Owing to many causes there was not a full month's run. If there had been, and the batteries had been cleaned up, the company would have realized \$30,000 at least.

**THE GENERAL GRANT.**—During nearly the whole of the present month the mill connected with the above mine has been closed down for want of water to keep the stamps in motion. At the mine men have been employed the entire month getting out rock, constructing tramways and putting things in first-class order generally. As the ditches are now open and plenty of water can be had to run the machinery, the mill has been started up. Good results may be expected.

**RICH ROCK.**—The rock taken from the mining claim of Powell, Morris & Co., situated at the junction of the Middle and North Yubas, within a few miles of North San Juan, is wonderfully rich in gold and silver deposits, if the half we hear is to be believed, and we have no reason to doubt it. An ounce of the rock, so we are informed, produced silver bullion worth 20 cents. A fire test made of some of the rock indicates that it will yield in gold \$100 to the ton.

#### Placer.

**RED POINT.**—*Placer Republican*, Jan. 25: Anthony Clark has bonded the Big Channel and Peckham Hill claims at Spring Garden to the French Company of Red Point for two years. Mr. Clark will receive \$10,700 for the bond and \$20,000 more if the company purchases. The Spring Garden claim, owned by Bradley & Nash, is also bonded for \$20,000 to the same company, whose engineers are already making a survey for a tunnel.

#### Shasta.

**GOOD ORE.**—*Shasta Courier*, Jan. 25: The Durf & Gerry mine just north of town is a daisy. Four foot solid ore body and assaying up to the \$1000 notch. Durf and Deadwood Dick are lucky boys, and we are glad the tide has turned in their favor, for they are men who have often pulled hard against the down stream of not very good luck.

**UNCLE SAM.**—The Uncle Sam mine and mill, Squaw creek, was attached last week by McCormick, Saelzler & Co. and other parties for somewhere in the neighborhood of \$7000.

#### Sierra.

**BALD MOUNTAIN EXTENSION.**—*Mountain Messenger*, Jan. 28: At the annual meeting of the B. M. Ex. Co., H. T. Briggs, S. B. Davidson, H. H. Purdy, Robt. Forbes and J. W. Orer were elected directors for the ensuing year. The date of the annual meetings was changed to the third Monday in January of each year. The total gold receipts for the past year are \$122,777.60; labor expense, \$52,750.34; supplies, \$28,022.08; taxes, \$554.85; dividends, \$33,000. Supplies are laid in and paid for a year ahead, and, with 4 miles or more of the channel beyond up the Pliocene ridge, this company is assured of a prosperous future, under the able and economical management of Supt. Wm. Meikle, for whom was passed a vote of thanks. At a meeting of the board of directors, H. T. Briggs was elected President, and J. W. Orer, Secretary.

**YOUNG AMERICA.**—John Casserly came down on snow-shoes from the Young America quartz mine Sunday morning, and reported 15 stamps running. Mercury, Jan. 12th, about 7 A. M., was nine degrees below zero at the mill, over 6000 feet altitude. Average depth of snow, seven feet.

**CUPEL.**—*Mohave Miner*, Jan. 28: At Stockton Hill the Cupel mine was compelled to close down for the reason that too much water had been found in the bottom of the 100-foot shaft. Several loads of ore are now lying on the dump of this mine ready for shipment. The Prince George mine will soon be started up and large quantities of high-grade ore should be shipped during the early spring. A quantity of high-grade lead ore is now awaiting shipment on the dumps of the Star Spangled Banner. The C. O. D. mine has been compelled to lay off about 20 miners on account of the snow, teams not being able to haul ore, nor were the men able to assort ore. Now that the weather has moderated, a full force will again be put to work, and as large bodies of ore have been exposed in the 300-foot level, the output of this mine will be large for months and years to come. At Todd Basin the Oro Plata has, struck more water than can be handled by hand, and the mine will probably lie idle until spring, when fine hoisting works will be put up at the mine. It is also reported that a mill for working the ore will be built at an early day. At Layne Springs the snow blockade has been removed and a full force of men

are now at work on the Night Hawk, Alpha and Pixley. At Mineral Park the whim that had broken on the Rural has been repaired and a force of men are at work on the 165-foot level, taking out large quantities of pure silver and black sulphurets.

#### Trinity.

**NEW RIVER.**—*Cor. Trinity Journal*, Jan. 21: Clements & Ladd are working the Mountain Boomer and have about 200 tons of ore on the dump. F. Colgrove starts up the Excelsior mine this week. The Excelsior is one of the best mines in the camp and has plenty of ore in sight. Mr. Colgrove, the superintendent, deserves great credit for opening up this mine, as two years ago it was considered almost worthless. Geo. Dean, superintendent of the Ridgeway, showed me a specimen from that mine that showed free gold on all sides; the piece of quartz weighed about five pounds and is the finest ever shown in the camp. The Carrie Company are working night and day to connect the lower level with the upper so as to get air into the mine; when this is done they will commence stoping, and, as they have several hundred tons of ore in sight and a six-stamp mill ready to run, they will make things lively. Mr. Sherwood is taking out good ore which he will crush in his arastra. The Uncle Sam mine has produced considerable bullion this season, and has plenty of good ore in sight. Several other mines are showing up well and with the event of spring lively times are looked for. The season of uncertainty has passed and a feeling of security in the mines is here and has "come to stay." Every one has the fullest confidence in the future of the camp, and property here that could have been bought for a mere trifle a year ago is not for sale now at any price.

**THE SNOW-STORM LEDGE.**—*Trinity Journal*, Jan. 28: Just before the heavy snowfall of the first of this month, Krumpe, a quartz propector who worked on East Fork last fall, found a large ledge of partly decomposed quartz on the Hay Fork mountain, between Summit Creek and the foot of the mountain, in the Hay Fork mining district. The ledge is over 20 feet in width and is composed of a mixture of quartz and porphyry, about  $\frac{3}{4}$  of the vein matter being quartz. Two or three weeks ago, Mr. Jas. Trotter made three assays of ore from the ledge, and the rock went from \$8 to \$31 to the ton in free gold, besides carrying sulphurets, at least  $\frac{1}{4}$  the value of the rock being in sulphurets. The ledge was traced for some distance, but the bad weather of the past few weeks has prevented further prospecting. The location is owned by Messrs. Krumpe, Trotter, Suller and Scott.

#### Tuolumne.

**ONESTI MINE.**—*Union Democrat*, Jan. 24: Mr. M. Foot of Groveland informs us that the Kendall roller-mill is on the ground and the framework is all ready for erection. This mill is supposed to crush to tons per day of 24 hours, with four-horse power, and to ordinary fineness.

**BIG BASIN.**—A new and fine chute of ore has been discovered in the Big Basin mine. The miners had gone by it in the tunnel, as it presented small evidence of amounting to anything. However, Mr. Hamilton last week placed some men at work thereon and the work resulted in the finding of the above chute.

**EXPERIMENTAL MINE.**—This mine at Columbia is now in active operation, and the entire number of stamps, 10 in all, are doing large work. Heretofore this mine has had many disadvantages to overcome, but now it is in a fair way of producing good results. The Longfellow mine at Groveland is now being reopened by a New York company. It was never worked to any great depth, but as far as developed it gave fair results, and now after many years it has again become a gold-producer.

**THE KANAKA MINE AT GROVELAND.**—*Union Democrat*, Jan. 24: We learn that the mill on the Kanaka mine is in full and active operation, and at present the indications are very encouraging for big results. This mine is well developed with tunnels and drifts and large ore bodies in sight, and thus far the big end of the chutes is down instead of up, a fine element of future great prosperity. The aggregate length of tunnels is nearly 1200 feet. The yield of the quartz thus far crushed has been on an average \$12.50 per ton free gold and \$1.50 in sulphurets. This is a well-developed and splendid property. It is a contact lode, that is, its walls are of different formation, and the direction of the lode is northeast, and oblique across the country formation. This gentleman also has the management of some other very promising properties, but which as yet are undeveloped. There are the Young Tuolumne and Herbert Shaw mines, which by milling process have yielded \$35 and \$28 per ton. The Young Tuolumne mine is about 15 feet in width and the Herbert Shaw is about two feet in width. This spring and summer will undoubtedly witness important changes and a general prosperous condition of the Groveland community.

**SAN GUISEPPE.**—Mr. Fred Sutton is now pumping out the water from his mine, the San Guiseppe, and soon he will be ready to get out ore again and produce surprising results. The ore is submitted first to a roasting process and then treated in an arastra. The sulphurets are principally of iron, and arsenical pyrites, and even the roasting process is not entirely complete. The ore pays about \$50 per ton, although, as the desulphurizing process is incomplete, only about \$40 per ton is realized. The tailings after coming from the arastra assay well, and the gentleman intends ultimately to erect chlorination works.

**MORE STAMPS.**—Messrs. Seeber & Co. at Whisky Hill have placed six additional stamps in operation, making 15 in all, and now the entire number are running at the rate of 100 drops per minute and crushing 30 tons per day of 24 hours. The mine is about 14 feet wide, and everything is sent to the mill. The quartz is not at all refractory, and the gold amalgamates readily. Vigorous and economic management makes this mine a representative property.

**LONGFELLOW.**—*Cor. Tuolumne Independent*, Jan. 28: Col. W. C. Root of New York has bonded the Longfellow mine at this place (not Groveland, as a Sonora paper incorrectly stated last week). Machinery has been shipped from the East, and the superintendent, Mr. T. J. Quimby, has a force of men now employed starting a shaft and preparing to place the engine and pump as soon as they arrive. The Longfellow has always been considered



a good mine, having yielded largely in early days, and Col. Root stands an excellent chance of "striking it rich." There is nothing doing here at pocket or placer mining. Mr. J. T. Jackson expects to make a good cleanup on his claims south-east of here as soon as a thaw permits him to work. There is a report that Mr. J. H. Crystal has purchased the Armstrong & Co. mill at this place, and that he intends to use it in developing the Accident or some other mine in the vicinity. He bought a share in the Accident some time ago.

#### Yuba.

**RICH STRIKE AT SMARTSVILLE.**—Grass Valley Union, Feb. 1: A rich strike is reported in the Golden Gate gravel mine at Smartsville by Charles Compton & Co., who are working the ground on tribute. The prospects are as much as 25 cents to the pan, and the pay channel is both deep and wide. The tributaries have been at work since last season opening the ground, and their confidence in its value is now about to be rewarded by big cleanups. The Golden Gate claim is principally owned by Patrick Campbell, and for working it by the hydraulic process, he was so much harassed by injunctions, fines and arrests that he finally discontinued operations on the ground. He subsequently made a contract with Compton & Co. to work it by the drifting process, although that was considered a doubtful experiment by nearly all the miners of the district. If the pay channel proves as wide as it is believed, the strike is very important, as the Golden Gate embraces a large extent of ground.

#### NEVADA.

##### Como District.

**THE COMO-EUREKA.**—*Virginia Enterprise*, Jan. 24: The Symonds Bros., who last worked the Como-Eureka mine at Como, have interested a few Stockton capitalists in the mine to the extent of buying in the controlling interest in the stock and compromising with the creditors on a settlement based upon the payment of 50 per cent spot cash and the other half in the stock of the concern. This must be eminently satisfactory to the creditors, as the thing seemed hopelessly involved, and the fact that men are putting good money into the concern shows that work will surely be prosecuted and the stock made merchantable to nearly its face value, to say the least. Clayton Belknap and Colonel M. N. Stone held about a quarter interest in the mine, and they passed their holding over to these parties last Saturday on the above terms.

##### Washoe District.

**BELCHER.**—*Virginia Enterprise*, Jan. 28: Since the last report the 400 level south drift has advanced 12 feet; total length, 242 feet. The west crosscut which was started 230 feet in, is in 18 feet in low-grade quartz and porphyry. The 500 level south drift has advanced 27 feet; total distance run, 105 feet. The Sutoro tunnel drift is out 1115 feet.

**HALE AND NORCROSS.**—On the 400 level the north drift was advanced 65 feet and the south drift 60 feet. Both of these drifts are in a strong body of low-grade quartz. On the 700 level the development shows still further improvement. Work has been resumed at the top of the north upraise and raised two sets of timbers, making nine sets high, and the north drift from the top of this upraise is now advanced 55 feet, the last ten feet being in rich ore. The south upraise is now extended 80 feet above the track and continues in fine ore. Milling of the usual quantity of ore has been resumed at the Vivian mill on the Carson river.

**SAVAGE.**—On the 400 level the north drift has been advanced 19 feet and continues in ore of good grade. On the 500 level the upraise is now extended 105 feet. On the 600 level the south drift has been advanced 37 feet in fine ore. The face is in fair-grade ore. There is again sufficient water in the Carson river to run the mills, and are supplying the usual quantity of ore produced from the several levels from the 400 to the 900 stations. On the last-mentioned level, 150 feet west of the shaft, ore of good quality has been encountered since last report.

**JUSTICE.**—Are upraising to connect the 490 level with the 340, and are running drifts southeast and north. Are doing a good deal of prospecting work, and in a week or ten days will commence to extract from 20 to 25 tons of ore per day. The lack of milling facilities is sorely felt by this mine, as they have now over 1400 tons of ore on their dumps, and the mine is sufficiently explored to insure a continuous supply for a ten-stamp mill for an indefinite period.

**GOULD AND CURRY.**—On the 250 and 300 levels small drifts are being run in the old stopes. Are putting in a sill floor, chutes, etc., and expect to extract some ore during the coming week. On the 1300 level the south drift from the east drift has been extended 46 feet; total length, 190 feet. The formation is soft porphyry, with streaks of quartz.

**YELLOW JACKET.**—Extracting the usual quantity of ore and shipping the same at the 1100, 1200, 1300 and 1400 levels. The new find on the 1100 level near the Confidence line continues to improve as explorations are made and bids fair to turn out a veritable bonanza, though very little is definitely known of it yet.

**OCCIDENTAL.**—The south drift from the top of the south winze has been extended 11 feet; total length, 19 feet. Upraise No. 1 south of north incline winze has been raised up 13 feet; total raise, 62 feet. At the top of No. 2 upraise have drifted south 19 feet.

**CROWN POINT.**—The 500 level raise is now up 56 feet, and the ground is growing softer as they advance. The 600 level south drift is now out 55 feet, having made 32 feet during the week. The 500 south drift is exactly at the line of the Belcher.

**ALPHA, IMPERIAL AND EXCHEQUER.**—The work of exploration goes on in these properties with vigor. A fair prospect has been struck 25 feet east of the shaft 382 feet deep, but very little is yet known of its extent and value.

**CHOLLAR.**—Work on the incline to the Sutoro tunnel level continues, and the usual amount of ore is being extracted from the several levels, and exploring work is being vigorously prosecuted.

**UTAH.**—On the 470 level in the north drift 335 feet from the west crosscut No. 5 have advanced east crosscut No. 2, 48 feet. The formation is vein porphyry and clay, showing some water.

**SEGREGATED BELCHER.**—The south drift from

the upraise has advanced 26 feet during the week; total distance made, 86 feet. The ground consists of low-grade quartz.

**SCORPION.**—On the 300 level the north drift is advanced a total length of 74 feet and the south drift 60 feet. Both are in vein material.

**ALTA.**—The regular work and extraction of ore continues from the 1100 and 700 levels, but the mill is not yet running.

**BULLION.**—The shaft has reached the 500 level, and a station will be cut preparatory to drifting.

**ANDES.**—Are running west on the 350 in porphyry and east on the 240 level in quartz.

**BENTON.**—Drifting on the 725 level, and there is no change to report.

**POTOST.**—The stopes on the upper levels are yielding their usual quota of ore.

#### Eureka District.

**THE EUREKA CON.**—*Sentinel*, Jan. 21: The citizens of Eureka, Ruby Hill, and, in fact, the entire district, have felt greater encouragement during the week than at any time for the past two or three years. The reason for this, is that the talk about the new strike in the Eureka Con. mine is founded on fact. There is no secret about it, as no one who has expressed a desire to go into the mine has been prevented from doing so. About 250 tons of ore has been sent to the furnace since the last issue of the *Sentinel*, and it is known from those that have seen it that a drift has been run a distance of 45 feet, and a crosscut driven 20 feet, both entirely in ore, which continues on in each direction. The extent of the ore body is not yet known. The president of the company arrived here on Thursday from San Francisco, and went through the mine. On his return to town a *Sentinel* reporter interviewed him, but could get no particulars. He simply expressed satisfaction with the general outlook of the mine, and said: "It looks fully 200 per cent better than I expected." And as the new strike is situated in a part of the mine where there is room for a very large chamber of ore, its extent cannot be ascertained without further exploration.

**THE NEEDLE.**—Charles Dehman made a trial shipment of three lots of ore from the Needle mine to Salt Lake City a few weeks ago, and the returns were as follows: Lot one, 30 per cent lead, 446.30 ounces silver, and .170 ounces gold. Lot two, 20 per cent lead, 205 ounces silver, and .120 ounces gold. Lot three, 10 per cent lead, 61.60 ounces silver, and .050 ounces gold. The Needle mine is a valuable property, situated near the summit on the west side of Prospect mountain, a short distance southerly from the Grant mine.

#### Gillis District.

**THE BURNLEY.**—*Esmeralda News*, Jan. 28: The owners of the Burnley mine have struck it rich in their new shaft at the depth of 60 feet. The exact width is not yet known, but at present they have a six-inch streak of very rich rock, characteristic of the ore found in the old works. An ore shipment may be expected within a few weeks from this mine from which a big result is almost a certainty.

#### Tuscarora District.

**BELLE ISLE.**—*Times-Review*, Jan. 27: The progress is slow in extending the crosscut east, 250-foot level. The rock continues very hard.

**NAVAJO QUEEN.**—Rock passed through in shaft this week is getting harder, and looks favorable for ore. Hope to cut the ledge in the next 50 feet.

**FOUND TREASURE.**—Drift, 150-foot level, has been extended 30 feet during the week. The ground is heavy and full of slips, which makes it necessary to timber the drift close up to the face as it advances.

**GRAND PRIZE.**—The stopes have yielded more ore than usual during the past week, and of a better grade. The mill was started last Monday; is running nicely and working the ore to a high percentage. Average battery assays \$201 per ton.

**NEVADA QUEEN.**—Crosscut to the east vein, 350-foot level, has been extended 29 feet; total, 163 feet. The face still shows seams of quartz. Have started a drift in the best portion of the vein, and will run south and connect with North Belle Isle. The ore is from four to six feet wide, and good grade.

**NAVAJO.**—South drift on west vein, 350-foot level, has been advanced 10 feet; total length, 242 feet. No. 2 crosscut from same is in 23 feet. South drift from No. 4 crosscut, east of the shaft, has been extended 11 feet; total length, 110 feet. The face is in favorable looking formation. North and south drifts from No. 1 upraise, east lateral vein, have each been extended 10 feet. In north drift the vein is small, but very high grade; in the south drift the vein is large, but low grade.

**COMMONWEALTH.**—The main shaft has been sunk and timbered 25 feet; total, 271 feet. The north drift, 100-foot level, has been advanced 11 feet. The ore continues the same high grade as heretofore, with a slight increase of water coming through the face.

**NORTH BELLE ISLE.**—North lateral gangway, 400-foot level, has been extended 150 feet. Better progress will be made in extending it the next 150 feet, at which point crosscutting can be commenced. In the face of the gangway the seams show faces of very high-grade ore, and considerable water.

#### Wild Rose District.

**PARADISE VALLEY M. Co.**—*Silver State*, Jan. 30: For the week ending January 23, 1888, ore produced and delivered to the mill, 130,500 pounds. Average assay value in ounces per ton—silver 13.11, gold 0.07. Produced 320 sacks of concentrates, 20,910 pounds, par value \$1245.88, which were shipped to the Selby Smelting & Lead Co., San Francisco, Cal. The north and south drifts on the Wild Goose vein from the west crosscut each show about 3½ feet of ore of slightly improved average value, the metal being more generally diffused through the quartz. Each drift now shows about the same quantity and value. The result of amalgamating the gold in the mills is quite satisfactory.

#### ARIZONA.

**THE HOWARD MINE.**—*Prescott Courier*, Jan. 24: Mr. Barrington, one of the owners of the Howard gold mine, drove his team into Prescott yesterday after provisions, ore sacks, etc. We met him on Montezuma street, and he freely gave us the following

information: The bottom of the shaft was, yesterday, about 33 feet below the surface. At this depth the vein is fully 12 inches thick; the ore is of a beautiful reddish-white color, honeycombed and heavily laden with small particles of gold. He had with him several specimens, and our ancient eyes beheld gold everywhere. Messrs. Hurlan and Barrington, owners of this famous property, are selling the richest pieces for "specimens," which are being sent all over the civilized world; sacking the poorest ore, and will get the gold out of it in their arrastra. They are now sinking, but may, ere long, drift on the vein. The amount taken out by them in a few days is about \$8000. Mr. Barrington further said that snow was quite deep around the mine, and that the whistle of the Standard Milling and Mining Co.'s mill on Groom creek was, for the first time, blown a couple of days ago. The Scotch Lassie mine, Turkey creek district, which belongs to our enterprising merchant, J. L. Fisher, and Mr. Dunkel, is a very rich silver property. It is well prospected by a shaft and tunnels. Its richest ore yields about 1200 ounces in silver; the poorest, 104 ounces. Average value of the ore, about 400 ounces. The richest ore vein is about 6 inches thick; a carload of the best is ready for shipment. The Oro Fino hydraulic company, Mr. Dolph, manager, commenced washing gravel a couple of days ago. Mr. D. started "the works" with 400 inches of water, which quantity is all the time increasing. He is in hopes of making a very large cleanup of gold in a short time.

**A MINER'S COMPANY.**—*Clifton Clarion*, Jan. 25: Sunday evening a meeting was held for the purpose of forming a joint mining stock company. The following mine-owners were present: A. D. McLean, Gordon McLean, J. H. Hovey, Marion Mitchell, Chas. B. Hogsett, Eugene Sherrin, Captain Ben H. Harveor and J. B. Jordan. A. D. McLean was called to preside pro tempore and P. J. Clark acted as secretary. The object of the meeting, as stated by Mr. McLean, was that the Coon mine, owned by Hovey & Co.; the Snowstorm Hovey; the Phenix and Gnat, Church and the McLean Bros.; Hardscrabble and Toughnut, Mitchell & Co., should be consolidated to constitute a group of mines, to be worked under the management of said joint stock company after organization shall have been effected. The first and foremost purpose of the company will be the erection of a five-stamp mill as soon as a sufficient amount of money is subscribed. The wagon-road to the Wonderful claim will be completed probably during the coming week. When finished the leasers will ship about 300 sacks of ore which they have on the dump. It is reported that a party of moneyed men from Silver City will shortly visit Clifton with a view of investing in a stamp-mill, providing the district will show enough ore to warrant the venture. Messrs. Campbell & Muir, who several weeks ago made a shipment of ore to San Francisco, have as yet received no returns. The delay is probably owing to the freight blockade on the Southern Pacific. The Arizona Copper Company are making a very satisfactory run from the three furnaces now in blast. They have already produced and shipped so far this month over 100,000 pounds of matte alone.

#### DAKOTA.

**GALENA SMELTER.**—*Deadwood Pioneer*, Jan. 26: For the past week or more, rumors have been afloat that three prominent mining companies, operating in Bear Butte district, were about making a proposition to directors of the Galena Smelting Co. for a lease of the plant belonging to the latter corporation. The mining companies proposing to form the combine can themselves supply sufficient ore to keep the works in constant and continuous operation for an indefinite period. Conversation with Secretary Seible, last evening, developed that while the smelting company has received no formal proposition for a lease, the subject has been broached. That his company is favorably disposed to the idea, and will therefore entertain any reasonable offer that may be made. It is not probable, however, that any contract will be entered into before the latter part of next month, and perhaps not even then; the enterprise hinging a good deal on the weather and the good or bad condition of the roads. In the event that the lease should not be made, the plant, if satisfactory arrangements can in the meanwhile be accomplished, will, however, be again blown in for custom work by the company owning it, on or about the 1st of April. The general dissatisfaction recently expressed with returns for ore shipped to Omaha will perhaps work a change of sentiment toward this home enterprise, and the former difficulty had in getting sufficient ore to make its conduct profitable, and necessitating its shutting down, thereby be obviated.

#### IDAHO.

**STRUCK THE LODE.**—*Idaho Avalanche*, Jan. 28: The Proustie Mining Company has struck the St. Johns lode with the crosscut from the Henrietta, the lode being about three feet wide of good ore, and well defined. When we say good ore, we do not mean to convey the idea that it is rich, like that in the Henrietta, but fair milling ore. This company, through its energetic superintendent, B. S. Howe, has demonstrated that the lodes at Wagon-town go down and are permanent, and more than that, the ore is rich at considerable depth. A depth of 300 feet has been attained in the Henrietta and St. Johns, which is lower by about 600 feet than the mines on the mountain above. Truly Wagon-town never presented so good an outlook as at the present time.

**BULLION.**—The Phillips & Sullivan mine turned out five large bars of bullion, valued at over \$11,400, as a result of the first run. The ore is not high grade, working only about \$32 per ton, but the vein is so large and the quartz so easily extracted that at these moderate figures there is a handsome margin of profit. The mine will now be opened up and worked systematically, when it is hoped and believed that it will keep at least one mill busy reducing ore, and pay handsomely.

**MILLER.**—We learn that the Miller mine, War Eagle mountain, is looking well, and that a rich body of ore is now in sight. Mr. Miller feels sanguine that he has a bonanza, and proposes to open it up in good shape.

**FOURTH OF JULY.**—*Ketchum Keystone*, Jan. 28: The Fourth of July mine is situated at the head of

Little Smoky, and within two miles of all the producing mines of the district. All the surface ground of the location contains two parallel lodes within its boundaries, about 150 feet apart; and designated as lodes No. 1 and No. 2. No. 1 has several cuts and shafts along the lode, showing ore in every place, and a strong lode from three to six feet wide. No. 2 is prospected by a tunnel driven on the lode a distance of 50 feet, showing a two-foot ledge of ore almost the entire length of it. The ore averages from 15 to 50 per cent lead, from 30 to 60 ounces in silver, and \$20 in gold per ton. The Fairview and Phoenix comprise two locations adjoining each other on the same lode. The exploitation work being done on this property is commenced by a tunnel on the Fairview claim running directly in on the vein. The claims are so advantageously located that as the tunnel gains in length it also gains in depth on the lode from the surface. The tunnel now being driven is constantly developing these important prospects, owing to their natural situation for easy and economical working. Reports lately received from the mine state that as the tunnel advances into the center of the hill and depth constantly gained, the quality of the ore is improving in grade and the vein increasing in width.

#### MONTANA.

**WILL SINK TO THE EIGHT HUNDRED.**—*Inter-Mountain*, Jan. 23: It has been decided by the Gagnon to sink still another 100 feet, making the total depth of the shaft 800 feet. The work will commence as soon as the station at the 700-foot level is completed (to which depth they have just finished sinking) and the drifts started. The shaft below the 600-foot level is three compartment. They will also sink 100 feet deeper on the Independent. The present depth is 200 feet. This work will commence as soon as the tank is put in at the 200-foot station to take up the water.

**A TEMPORARY SHUT-DOWN.**—Saturday evening the mines of the Chambers syndicate—the High Ore, Wake-Up-Jim, Modoc, Bell, and one or two others—were closed down and the miners laid off. The cause of the shut-down is not made public, but it is understood it was for the reason that so much ore was on hand that it was necessary to stop the output until the works at Anaconda shall reduce the supply, thus making room for further production, and that the shut-down is only temporary. The mines were never looking better nor the output so great.

**SILVER MINE SOLD.**—*Inter-Mountain*, Jan. 25: It is currently reported that Mr. Sweeney, owner of the Big Bonanza mine, west of Walkerville, has sold the same to local parties (whose names have not been learned) for \$35,000. The mine is regarded by those who are acquainted with it to be cheap at that figure. It is pretty well developed and shows plenty of ore of a fair grade, and there has been some exceptionally rich ore taken out lately. Some that has been shipped went as high as 500 ounces to the ton. The Big Bonanza was originally the Plover and was formerly owned by other parties who by making a mistake of a day in the calendar lost the property. They had made all arrangements for patenting, but let the 1st of January pass, when it became jumpable and was relocated by other parties and held by them. It promises from the present development to show that it is clearly entitled to the name which it bears.

**THE ANACONDA.**—*Review*, Jan. 26: Reports are being circulated and different stories published about what the Anaconda Co. have done, what the Chambers syndicate are doing and that the Anaconda smelter has shut down, till the poor public hardly know what to believe. The *Review* will say that the new concentrator of the Anaconda Co. has shut down, and that for reasons best known to the management. The mill was stopped last Friday afternoon. The stoppage as a matter of course is only temporary, and as the mill was stopped the Chambers syndicate mines at Butte, which furnish the silver ore for the mill, were also shut down. The outside work of the company is being pushed forward with renewed activity; the superstructure for the new smelter building is all up in place and by Saturday evening the buildings will all be inclosed. A large force of men are at work excavating for the foundation for the addition to this smelter building. There is nothing in the world that begins to approach the gigantic scale upon which these works are being constructed, and we are told they are but in their infancy.

#### NEW MEXICO.

**HORN SILVER.**—*Kingston Shaft*, Jan. 24: A fine vein of horn silver and sulphide has been struck on the Charm, adjoining the Sweepstakes by Hume. C. Dumm from Danville, North Percha, was in town 1 Thursday. He reports the North Star looking well and full of ore, but as yet mostly low grade. John W. Honsinger has uncovered ore in the drift now being run in the Leonoclast for over 40 feet. It looks like Temp' ore and assays like it, 175-ounce ore is good. Chas. D. Eckstein has been in town this week, from a long siege of work on some mining property of which he is principal owner, viz.: the Esmeralda and the Nip & Luck. These claims lie west of and adjoin the Solitaire, Homestake and Turtle, and are about four miles north of the Lady Franklin. Marble, Stillman, St. George and Call have struck water on the Silent Friend. Chris Martin has found some fine ore on the Homestake, on Mineral creek. A large amount of ore has been shipped this week from the Brushback lease; the Brandon teams took out 3½ tons at one load.

#### UTAH.

**REVIEW.**—*Salt Lake Tribune*, Jan. 28: The week has seen the break-up of the severe cold weather which prevailed such an unusual long time for this region. Still, the receiving of ore has been light. The receipts of the metals in this city for the week ending the 25th instant, inclusive, were to the value of \$80,000.78, of which \$63,130.01 was in bullion and \$16,870.77 in ore. The week previous the receipts amounted to \$208,924.92, of which \$83,418 was ore and \$125,506.92 was bullion. The product of the Ontario for the week was of bullion, 17,085.66 fine ounces; no ore sales. The Daily output for the week was six bars of bullion, 9872.71 fine ounces; no sales of ore. Fine bar receipts for the week amounted to \$26,957; base bullion, \$8500.



## MECHANICAL PROGRESS.

## Duties of a Shop Foreman.

J. T. Langdon, in the *Wood-Worker*, gives his opinion of what a shop foreman should be in the following words:

We should say in the first place that he ought to be a man of strictly temperate habits. You may say I am drawing the lines close here, but it is, nevertheless, true to the letter, and I emphasize it very emphatically. No man having charge of men or machines should ever step over the line of strictly temperate habits. Here is the base and foundation upon which they should stand solid and firm. One reason for this is, he wants a clear head at all times, no matter what the difficulty is; even if there is no trouble, he wants his head *always* level and clear.

Granted that we have got that, the next thing we want is that he should understand perfectly the mechanical part of his business. He should not only be able to do well every part of the work, but should be able intelligently to impart this knowledge to others in such a way that when he is not able to attend personally to any particular work he wants done, he will know that when he puts any of his men to work it will be done right. He should also know every part of his machine in detail, so that when any part is broken he shall be able to make a free-hand sketch of it, instead of sending the broken part to the concern that made the machine; he can send a sketch of it, which will be all that is necessary.

Sometimes, of course, a new machine is introduced into the works, and for a time he may know only the general principles of it, but just as soon as possible he should post himself up on every identical piece and know its value and use. Here is where many a foreman is lacking, and I very much doubt if there is one foreman in five throughout the country, who, if their machines were pulled to pieces and thrown into a pile promiscuously, could go to work and pick out each piece and tell what part of the machine it belonged to. A great many times from this cause, a machine may run badly, and he not knowing just where to locate the trouble, has to do as hundreds of our M. D.'s do, guess what's the matter and try a dose of this and a dose of that, till perhaps by accident he hits the right place. This is a poor way to get along. The machine doctor should be able to diagnose the case at once and apply the proper remedy then and there, without delay. Ofttimes a break-down occurs, and by a quick foresight the foreman can fix it up for the time till the hurry is over or perhaps run till shutting-down time, when the broken parts can be repaired so you can start up on time the next morning.

We should not expect everything of a foreman. He may be a good manager and understand his work to a nicety, and yet not be able to go to the forge and weld and hammer iron or make bolts or cutters, or run a lathe to turn up shafting, or fit up machinery. This is the blacksmith's part, and every concern which has its own power should have an engineer who is a practical mechanic and able to do all this kind of machine-work. A foreman's time is generally more valuable about the keeping things in order and pushing the work along than in acting the part of machinist and foreman, too. When too many iron are in the hands of them are pretty sure to get burned.

The main point is to keep things moving, and he should have the tact and energy, understanding and judgment to, as the saying is, "take the bull by the horns." It certainly is no objection to have a man who can go to the forge (and certainly no mill, however small it may be, should ever do without a forge and anvil and a few pairs of tongs) and do a good job; but, as I have remarked, it costs more than it comes to generally.

**MANUFACTURE OF ALUMINUM.**—Constant improvements are being reported in the production of aluminum whereby the cost of its manufacture has already been very much reduced. The indications are that still further improvements will be made until the metal will become so cheap that it will be made to enter into the manufacture of a vast number of household and other articles for which it is most admirably fitted. The latest improvement in the production of aluminum has recently been patented in France. The work of manufacture is divided into two parts, in the first of which 10 parts by weight of powdered alumina are mixed with four of lampblack, a sufficient quantity of tar being added to form a thick paste. This is then placed in a suitable receptacle and calcined at a red heat till the oil or tar is completely decomposed, leaving a brittle solid, which is then broken into small lumps and subjected in a closed vessel to the action of an atmosphere of carbon bisulphide, a current of which is kept constantly flowing through the vessel. On raising the temperature it is said that this agent decomposes the carboniferous mixture with the production of carbonic acid gas and a sulphide of aluminum, from which the pure metal is afterward obtained with the aid of hydrogen.

**IRREGULARITY IN MECHANICAL DEVICES.**—It has always been more or less of a puzzle, says the *American Mechanist*, to account for the reason of certain mechanical devices working satisfactorily in one locality and not in another. There is a variety of packing for

steam engines, for example, and in one part of the country one kind will be found in common use, giving excellent satisfaction, while in another place the same kind of packing will not seem to work at all. The reason is probably almost entirely one of education, not necessarily perhaps in the use of packing, but in analogous directions. In some parts of the country a certain class of machinery will be sold, and will be used with the best satisfaction. In other localities this same kind of machinery cannot be sold, or, if sold, its use will not give satisfaction. This is generally laid to prejudice, but it is more likely that education has much more to do with it. Shrewd salesmen understand this, and they understand that it is practically useless to undertake the slow process of educating people to buy what they have not already learned to like and use. They find it more profitable to sell what there is a demand for, letting the demand for something else grow up by the usual slow process.

## Blistered Boiler Plates.

Many boiler plates, which appear all right on being placed in a new boiler, are often soon found to be blistered after short use. The *Locomotive*, in alluding to this fact, says that a laminated plate only needs the application of a little heat to blister it, and this two may be considered one and the same thing. Lamination, which leads to blistering, is due to imperfect welding of the different layers of which iron plates are made up, and is never found in steel plates. The very best iron plates sometimes blister, even those made of the best material, and which have been made with the utmost care. This is due to the fact that in rolling plates, as in every other kind of work where iron has to be welded, an imperfect weld will sometimes result, in spite of any amount of care and skill. Where the lamination exists at the edge of a plate, it should always be seen during the construction of the boiler, and if of considerable extent the plate should be rejected. But unfortunately this is not always the case. The lamination is more apt to be somewhere away from the edge of the plate than anywhere else, and then its detection is difficult and in most cases impossible, until it begins to blister under the influence of heat. The treatment of a blister depends entirely upon its character and size. In the majority of cases judicious trimming at the proper time will be the only thing necessary. In other cases the lamination is so deep, and extends over so large a surface, that the entire sheet has to be removed.

**MACHINERY AND LABOR.**—Occasionally the members of one or another trade are stirred to a sense of the supposed injury that improved machinery and processes are working toward them. They claim that improvements have encroached upon their business, until they do not get as much work as formerly. Looking back 25 or 30 years, few will be inclined to dispute this, as then the day's work of this class of workmen began anywhere from four to six in the morning and continued till nine in the evening. Now they work ten hours. As to improved machinery and new means of accomplishing ends affecting the blacksmith, it is probably true that it saves him a good deal in the way of hard work and drudgery, and enables him to live much better on the product of fewer hours' work. The skilled workman will always be indispensable in almost every mechanical or manufacturing industry and in every locality. There are too many things in his trade that require the exercise of judgment and thought to allow a machine to supplant him, and it may be added that it is a difficult matter to make a satisfactory machine of a blacksmith.

**THE SHAVING PIPE.**—When the planer man has to stop about every day to clear out the shaving pipe which leads from his machine, it is a pretty good sign that something is too small. Two men and a planer stopped 10 minutes at a time to shove a pole into the shaving pipe is misapplied labor. Better get a bigger pipe. Then it would be necessary to get a larger blower, and that thought sticks right in the owner's pocket. He had half a mind to get a big one when he fitted up the shop, but he found he could save \$10 by getting this small one, so he bought it.

**JACKETING WITH EXHAUST STEAM.**—The *Railroad Gazette* points out what it assumes is a glaring defect in the design of the cylinder of stationary engines, viz., jacketing the cylinder with exhaust steam. We remember that there was a little—not much—of this practice about 20 years ago, but the error was at once pointed out, and we should be surprised to know that it was practiced by any reputable builder of the present time.

**STEEL SHIPS.**—The orders for steel ships in England are rapidly increasing and the steel-makers are anticipating a busy season in consequence. It is now considered quite certain that steel will hold the field for ship-building purposes, and iron ships will soon be as obsolete as wooden vessels.

**A PILOT ENGINE.**—Austrian engineers speak favorably of Gieszl's pilot engine for preventing railway collisions. It is worked by electricity, under the control of the engineer, and is run at any desired distance in front of the train, which it stops automatically on encountering any obstacle.

## SCIENTIFIC PROGRESS.

## The Formation of Coal.

In a paper recently read at a meeting of the Geological Society of London, by Mr. W. S. Gresley, entitled "Notes on the Formation of Coal Seams," which he says was suggested by evidence collected in Leicestershire and South Derbyshire, the author adduced evidence against the theory that coal seams were formed from vegetation growing on the spot. During an extended experience he has only once or twice detected stems passing into a bed of coal, and connected with the stigmaria roots in the underley. If, as was generally said, the stigmaria were the roots of the trees that formed the coal, such instances should be common. Not only are they rare, but the abundance of the stigmaria is extremely variable, and these roots, instead of becoming more thickly matted together in the upper part of the underley, as they should be if they were roots of the coal forests, are generally distributed throughout the clay in a manner that shows them to have been, in all probability, independent organisms.

Stigmaria roots, when found connected with a stem, are more often on the top of a coal seam than at the bottom. Other reasons assigned for rejecting the hypothesis that coal seams were formed of plants that grew upon the spot are the occasional absence of underclays, the sharp divisions between the coal seams themselves, and the beds above and below them, the distinct lamination of every seam and its division into layers of different mineral character that are persistent over large areas; the presence of similar foreign bodies in the underclay, and especially of pebbles and boulders transported from a distance; the presence of similar foreign bodies in the coal itself, and the circumstance that many coal seams are impregnated with salts, and are associated with salts containing marine fossils.

**THE OCEAN BEDS.**—Although geologists are accustomed to deal with considerable alterations of level as one of the causes operating to bring about profound changes in the topography of many regions, it has always seemed difficult to conceive that the vast depressions in the face of the earth now occupied by the oceans could ever have been subject to such tremendous changes as would be necessary to convert them into land. Many geologists, appreciating this difficulty, are inclined to believe in the general permanences during all time of the great oceanic beds, and of the continental areas. To account for the origin of the oceanic basins, Mr. Fisher, in the *Geological Magazine* proceeding from the theory of Professor Darwin, that the moon broke away from the earth more than 50,000,000 years ago, he thinks the ocean basins may be the scar left by the breaking off of the moon's mass, and that the basement rocks of the continents are fragments of the crust which had already solidified, and which were left behind.

**CHANGES IN MILK PRODUCED BY FREEZING.**—Two samples were experimented with by a Government chemist. One was frozen slowly, the other quickly, and afterward partially thawed. In the former case, the ice contained the greater part of the fat and the fluid portion most of the casein, milk-sugar and salts. In the quickly frozen and partially thawed samples, the fat was equally distributed between the solid and fluid portions. The author explains this by the fat globules rising to the top when the process of freezing is gradual. They thus become imbedded in the flakes of ice, while in quickly frozen samples this cannot take place, and the fat is more evenly distributed. If a dealer whose milk has been frozen pours off the clear fluid which underlies the ice, he is liable to the suspicion of adulteration on the one hand or will deliver milk above the standard on the other. Milk which has been frozen should be well thawed and shaken up and not sold while any ice is visible.

**INSECT REPRODUCTION.**—Perhaps no more striking illustration of the wonderful reproductive power of certain insects could be given than that contained in a work recently published by Theodore Wood, an English entomologist. It is assumed, first, that 100 aphides weigh no more, collectively, than a single grain; and, second, that only a very stout man can weigh as much as 2,000,000 grains. Then it is found that if multiplication were entirely unchecked, the tenth brood alone of the descendants of a single aphid would be equivalent, in point of actual matter, to more than 500,000,000 very stout men, or one-third of the human population of the globe, enposing each person to weigh 280 pounds.

**A GERMINATING SCIENCE.**—According to Dr. Horatio Hale, ethnology, or "the science of the races of man," will become a true science only when the tribes are grouped by the evidences of language. A scientific treatise on ethnology will commence like a treatise on chemistry, with the primary elements, which are the linguistic stocks. It will determine, as far as possible, the mother tongue and the original geographical center of each stock. It will describe the moral and intellectual traits and the physical characteristics of the people. It will ascertain their mythology, their social system, their industries and their arts. It will trace their migrations, their interminglings with other stocks and the moral and physical changes caused by

these wanderings and mixtures and by climate, soil, food, manner of life and all other influences. And finally, from ascertaining what has been, it will seek to determine what is to come and to show us something of the future which the human species, in its various divisions, may expect to attain.

**A NEW USE FOR DYNAMITE.**—*Nature* describes a new way of utilizing dynamite, lately devised by Mr. Bonnetond, a French military engineer, who uses the expansive force to drive out, for a brief period, the water from portions of wet ground in which foundations are to be made. The method is now in practice in the construction of a fortified enceinte at Lyons. A hole is first bored 10 feet or 12 feet deep, and about 1½ inches wide, in the wet ground. Into this is passed a string of cartridges or dynamite, which is then exploded. The water is thus driven far out beyond the sides of the cavity, over a yard wide, which is produced, and it does not reappear till after half an hour at least. The workmen thus have time to clear the cavity and introduce quickly setting concrete. When the water returns it cannot injure the foundation. A rapid rate of progress is realized by this method.

**THE FOUR ELEMENTS.**—The evolution of chaos into earth, air, fire and water can be represented in the following manner: In a narrow vial or glass tube, pour mercury to the height of one-fourth of its capacity; for the next fourth, add a saturated solution of subcarbonates of potash; next fourth, methylated or pure spirits of wine, tinted blue; and lastly, turpentine, tinted red. On shaking this mixture together, you will have a representation of chaos; but soon, on resting, the elements will separate themselves, and the mercury will represent earth, the blue spirit air, the red turpentine fire, and the colorless potash solution water.

**ELECTRICITY IN DELICATE WEIGHING SCALES.** M. Wurtzbourg, having noticed some incomprehensible differences in the weights of equivalent quantities, undertook investigations, which showed that balances of precision are often influenced by the electric state of the glass case which surrounds them, and this electricity influences the "riders" which slide on the beam of the balance. The error resulting from this influence may amount to 600 milligrams when the case is strongly charged, and two hours afterward there may still be an error of 10 milligrams.

**THE ELEMENTARY SUBSTANCES** now number 70. In 1837 they were 53. The size of an atom of oxygen or nitrogen is said to have a diameter of one ten-millionth part of a centimeter. They are supposed to be in a state of constant motion at the rate of 70 miles a minute, knocking against adjoining ones as much as 18,000,000 times a minute. To make them visible the present highest known magnifying power of the microscope would have to be increased nearly a thousand fold.

**SLAVE DEPENDENT INSECTS.**—The curious fact has been demonstrated by Sir John Lubbock that certain kinds of ants are unable to exist without keeping other ants as slaves, though why this is so, he has not found out. On removing the slaves from a nest of 50 slave-holding ants, he found that the latter immediately commenced to die off and were speedily reduced in numbers to six, when the slaves were returned and the mortality ceased.

**THE EARTH'S FUTURE.**—Some scientific writers predict a time when the heat of the earth will fall to a degree incompatible with organic life; others love to speak of the time when the English coal mines will be exhausted, and still others delight in figuring to show that the timber resources of the United States will be entirely exhausted in an uncertain period of time.

**THE BONES OF THE AGED.**—An English chemist has shown that the brittleness of the bones of the aged is not due, as is generally supposed, to an increase of the proportion of mineral salts with advancing years. From a section of the femur of 50 subjects of different ages no differences in the proportion of ash could be determined.

**THE TARANTULA'S ENEMY.**—The California tarantula has a deadly enemy, something like a wasp, only much larger, which attacks the monster spider whenever it sees him. Almost invariably these wasps sting the tarantula to death in a short time, and then tear the body in pieces and carry it away.

**IF THE EARTH WERE STEEL.**—and fully magnetized, its power would be about 7000 times as great as now. If the earth were of soft iron and magnetized by a sufficient amount of current, it would be about 15,000 times as strong a magnet as it is now.

**OUTWARD SWINING DOGS, ETC.**—The Wisconsin Senate has concurred in a bill to provide for the punishment of any architect, by a fine of not over \$100, who shall design any public building or factory and neglect to design outward swinging doors or fire-escapes.

**LIGHTING MINES BY ELECTRICITY.**—It has been found that mines can be lighted by electricity for one-half what it costs to light them by the old system of oil and candles. Besides, there is in electricity comparative immunity from fire.



## USEFUL INFORMATION.

## Modern Architecture.

Styles of architecture, both exterior and interior, as well as finish and decoration, are constantly changing. Architects on this coast have heretofore, as a general thing, been quite behind the times in this respect. The recent rapid increase of building in Southern California, and the advent there of many architects from various portions of the Eastern States, has introduced into Los Angeles county better and more varied styles of villa architecture than are to be found in the vicinity of either San Francisco or Oakland.

The architects of the Eastern States keep themselves more fully informed of what is going on in the way of improvement in European cities than do those of the Pacific States. To do this, however, it is necessary that competent men shall go every year to Europe to study style, finish and decoration. It is true, as a cotemporary has said, that a partial record of their improvements is furnished by the various magazines and journals, but no adequate idea of them can be obtained without personal investigation. A visitor from California in the Eastern cities is at once struck with the elegant and symmetrical simplicity of architecture, and a surprise is felt that so pleasing an effect is produced by such simple means. Just how this is done is a subject which requires much study and personal investigation.

By reference to an article under the head of "S. F. Institute of Architects" it will be seen that a new departure has recently been taken among the architects here by which the knowledge, skill and experience gained by any one member is freely thrown open for the benefit of all. The move is one in the right direction and is highly creditable to the architects on this coast, and will no doubt add much to the architectural ornamentation of San Francisco and Oakland during the boom in building upon which we are now just entering.

## Redwood Shingles.

"I desire to refer one or two questions about California redwood shingles to the readers of *Carpentry and Building*. I have seen redwood shingles that when first put on the walls and oiled looked very well, but after a few days or weeks, however, dark-colored shingles began to appear among them, and accordingly the sides of the building looked very bad indeed. I desire to inquire if there is any way by which this difficulty can be overcome."—A. W. H., Westfield.

In answer to the above, it may be stated that, to insure equality and uniformity of color, redwood shingles intended for oiling should be selected. The texture of the California production varies greatly, some being fine-grained, light-colored, soft woods, and other trees producing hard and brash kinds, down to what is known as black-heart redwood; consequently the yield in shingles from the respective classes must vary greatly as to color under treatment. Before exposure to the weather this difference is not so marked, nor even when used in ordinary roofs and painted, or the natural surface exposed to the weather. But it must be apparent that where soft, porous, and hard-grained, brashy shingles are laid indiscriminately in same connection, and oiled, the oil penetrates the one and disappears and remains on the surface of the other, producing widely different results in a little while.

Again, sappy redwood shingles should never be used, as the sappy parts have no lasting quality anywhere, and if used in shingles and oiled the sappy portions will speedily show contrast.—*Cal. Architect*.

## An Irish Invention in Glass-Blowing.

Ireland has long been famous for its whisky, and now bids fair to become as famous for its manufacture of bottles as it has hitherto been for their use as whisky conveyors. The new invention consists of a device by which compressed air regulated by machinery is made to do duty in glass-blowing, instead of air forced from human beings. It is claimed that a workman can turn out nearly three times as many bottles by the aid of this device as can be produced by the old method. The device is said to be very cheap, can be attached to the ordinary blow-pipe, and, unlike many previous attempts in the same direction, is a practical success. Glass-blowing is a very destructive work for the lungs—those who practice it seldom live much over 40 years.

The bottle industry is a very large one, the quantity produced per day in the respective countries being estimated as follows:

Great Britain and Ireland, 6206 gross; Sweden, 960; Norway, 600; Denmark, 360; Germany and Belgium, 30,039; Austria, 7000; France, 100; United States, 840; Canada, 120; Australia, 207; total, 46,432 gross.

With 300 working days this gives no less than 13,929,600 gross per year. The Germans, by means of cheaper labor and more care in producing a symmetrical bottle, absorb the great proportion of the trade at present, but this bit of Irish ingenuity may change the aspect of affairs.

**BURMESE PETROLEUM.**—Burmah has been known for ages to be rich in earth oil, and that material, raw and unrefined, has been ex-

ported in large jars or jugs thence to the ports of India long before petroleum was exported from America, but was used more for medical than other purposes by the natives. A few years ago some parties in Burmah started the business of refining petroleum on a small scale, but the enterprise has not proved growing, and their refined product must have been consumed at home, since it has not interfered with American petroleum in the least. But now that the British have annexed all Burmah, it remains to be seen whether efforts will be made to make the petroleum industry a success. That country is reported to be rich in petroleum.

**THE LONDON WOOL EXCHANGE.**—There are probably very few that have any adequate idea of the amount of business annually conducted at the London Wool Exchange. "About 1,000,000 bales of wool are sold during the year. This wool is all colonial; home produce and European wools are sold at Liverpool. The value of a year's sales is about \$100,000,000. The largest quantity of the wool comes from the Australian colonies, and it is also of the finest quality. Some idea of the industry there may be obtained when one knows that a single sheep yields about ten pounds of wool. A million bales would weigh 300,000,000 pounds, and this would take 30,000,000 sheep to produce it. The sheep are driven about the country in big droves, and they feed where they can. Sometimes, when there is a drought and the grass dries up, the farmers will pay a shilling to any one to take away a sheep and kill it. They die then by thousands. The shearing season commences in August, and the first wool of the new season's clip arrives in London in time for the November sales. Some years ago, when it was brought over in sailing ships, it did not arrive until May. The cost of freight is 2½ cents a pound. There are hundreds of vessels employed in this service alone."

**NEVADA WOOL,** it is said, commands better prices than any other clips. Justice, Bateman & Co., wool commission merchants of Philadelphia, in their circular under date of January 2d, give the following facts regarding Nevada wool: "Notwithstanding the lack of demand for other Territorial wools, the fine clips of Nevada, which are particularly suited to the present wants of manufacturers in this market, owing to their softness of finish, are inquired for to-day, and command relatively better prices than other Territorial wools. The market has been cleared of these qualities, and much more could be placed immediately at full quotations."

## GOOD HEALTH.

## Smallpox.

The picture of two Boards of Health contending for such position and advantages as may accrue from their appointment; the picture of a hospital ill adapted to the requirements of a first-class veterinary surgeon, much less of a doctor of medicine; the picture of constipated men and women crowding to the vaccination depots, must tend to excite the indignation of even the most indifferent. In the first place, a manly and courteous deference to the Governor's wishes and the public weal should obtain. In the second, a city of 300,000 inhabitants, the only seaport of large commerce on the Pacific Coast, and thus liable at any time to the introduction of zymotic disease, should have a hospital on land or water suitable in every appointment for the care of those suffering from epidemic disease. In the third, an insistence on proper vaccination within three months after birth, should the infant be in fit condition, and of revaccination within three days of all who land upon our shores from foreign countries with the view of taking up a residence among us. This latter could be done by the service of a notice on each emigrant by the ship's captain or some authorized person, which notice, unless produced with the signature of a qualified vaccinator within one week of landing, would entail a prosecution at the county's hands. Infant vaccination, as in England, could readily be made compulsory, and be easily accomplished. The extent and peculiar situation of America with regard to the influx of foreign peoples should lead our Government to take immediate and radical steps in this direction. So simple, sure and easy of accomplishment is revaccination that all objections to our proposal fade into insignificance. Surely the liberty of the citizen is not held in hand by laws preventive of such a disease as smallpox.

And now a word with regard to the precautions necessary to be observed during an epidemic such as the present. First of all, total destruction by fire of every article of clothing and of bed clothing which had been in contact with the patient, this to be followed by a thorough fumigation of the room by chlorine gas, which can be done in the following manner: In the center of the room set a vessel, containing water, which is large enough to contain another of porcelain, in which is placed one pound of chloride of lime. Having closed the windows, fireplace and all crevices, pour upon the chloride of lime half a pound of hydrochloric acid; immediately leave the room and lock the door for 24 hours. The paper should be removed from the walls; this can be done by placing in the room a boiler, and arranging it so that steam shall thoroughly fill the room

and loosen the paper. It comes off very easily when this has been done.

Should the patient not be in a fit condition for removal to a hospital, as was the melancholy case with the late Dr. Terrill, perfect isolation of patient and attendant is all that should be insisted upon. A sheet hung on the outside of the door and sprinkled occasionally with a solution of chloride of lime is to be strongly recommended, also the removal of the carpet (this applies to every sickroom) and the sprinkling of sawdust on the floor; this is easily brushed up and burned. Place the bed in the middle of the room with its back to the window; the light which is necessary for the patient's welfare can then be freely admitted without causing him annoyance. A fire should be constantly kept going for the purpose of aiding ventilation; this applies in both hot and cold weather. Smallpox, however, is more prevalent in cold spells, generally from January till June.

Are we to sacrifice the life of a patient by injudicious removal to protect those who ought to be able to protect themselves, or who rely upon the aid of efficacious ignorance? Every precaution should be taken in this early stage of the epidemic; misrepresentation of the state of the city's health only tends to treble injury in the long run. A quick, searching and intelligent method should be pursued by all. Health officers should be possessed of capacity, energy and experience. They should assist the people ably, and be assisted willingly by them in return. Confidence and courteousness should prevail, then the waving of a yellow flag would no longer be a source of aggravation, annoyance or ill-will. It behooves each and all to take warning while yet there is time—167 cases and 23 deaths for the first three weeks of the new year speak for themselves more strongly than can a few paragraphs in a newspaper.

## The Cancer Discussion.

The sad death, at the early age of 34, of Dr. Francis H. Terrill, graduate of the old and honored University of Virginia, deserves more than a passing notice in these columns. He many times expressed his conviction that the knife and fire were no cure for cancer, and was one of the few physicians interested in the effort to ascertain the truth of those claims made for the new method of treatment in this city.

A kind, courteous and skillful physician, his claims were universally acknowledged, as was evinced by a large and increasing practice. He came to San Francisco in the year 1883, previous to which he had been for five years surgeon in the American Navy. His appointment as surgeon on Colonel Dickenson's staff with the rank of Major was alone due to his gentlemanly bearing and merit. In this, as well as all other relations of life, he maintained the "honor and dignity of the profession" in the true sense of this much-heard phrase.

On being reprimanded by Dr. Plummer, secretary of the Medical Society of San Francisco, who asserted that his principles did not allow him to consult with any practitioner outside of the regular profession, Dr. Terrill answered: "My principles are those of liberality and independence in the practice of my profession." He further proceeded to inform the doctor that he had been a gentleman before entering the profession of medicine, and he was resolved to continue such while in it. Further, he declined, he said, to be dictated to by any clique or body of men, and he had some time before resigned his professorship at the Toland Medical college and membership of the society, in order to be a free man. The occasion of this reprimand was the having given much aid to, and held much confidence in, Dr. Hertzstein, an eclectic practitioner of this city. Practitioners of medicine: The words uttered by Dr. Terrill, who has been so early and so sadly taken from our midst, deserve to be engraved upon his tombstone. Let them be also your motto, and perchance you may achieve as bloodless and fair a fame as Dr. Francis Heath Terrill.

**VALUE OF HYGIENE.**—A medical professor of Munich, named Pettenkofer, has recently been advocating the necessity for more compulsory instruction in hygiene in all universities and technical schools. He insists that there are four classes of men who especially need a full knowledge of this science; they are physicians, architects, engineers and military men. As an illustration of the value of this knowledge, Prof. Pettenkofer cites some figures gathered from statistics of the Crimean and Franco-Prussian wars. In the former, he says, the proportion of French soldiers who died of wounds received at the hands of the enemy to those who died of disease was 100 to 375; while in the latter named war, 15 years later, the corresponding proportion in the German army was 100 to 43—a gain of 332 per cent. More than 70,000 German soldiers suffering from the typhoid fever and more than 30,000 prostrated with dysentery were transported across the French frontier home without any increase of the prevalence of these maladies among the country's civil population. All this the professor attributes to the advanced knowledge in hygienic laws. In London during the 17th century, when the population was only 1,000,000, the mortality rate amounted to 42 in every thousand, while now, with a population of nearly 5,000,000, the mortality only amounts to 21 for every thousand. The English people, their engineers and architects, have been studying hygiene.

## Mohave County Mines, Arizona.

**EDITORS PRESS:**—Mohave county, Arizona, has made more substantial progress, in the development of her mining resources, during the past year, than since the organization of the county. While Mohave has, for the past 15 years, been a steady producer of exceptionally high-grade ore, never, until within the last two years, have facilities been offered for the handling of comparatively low-grade ore with a profit, i. e., from \$60 to \$70 ore; and never before has the production been one-half what it was in 1887. Nearly \$1,000,000 worth of gold, silver and lead have been shipped from Kingman during the 12 months ending December 31st.

The C. O. D. mine has been converted from a mere prospect into a bonanza of wonderful richness and extent. The chloride ore, having been worked out to water level by chloriders, and the ore becoming low grade at that depth, a shaft was sunk to a depth of 300 feet, after erecting expensive hoisting works and pumping machinery. At 200 feet the ore began to improve, and has continued to do so, and also to increase in amount as depth is attained, until now there is in the bottom of the shaft and extending the entire length of the levels, over four feet of ore that works from \$350 to \$450 per ton by the carload. The Rural mine has been developed from a mere surface prospect of two or three inches of chloride ore to a bonanza two feet wide at 200 feet deep of ore averaging \$2000 per ton, and in many places the entire lead is more than half native silver. To see the glittering metal coming upon the surface reminds one of the Silver King in its palmy days.

The Juno mine has produced 500 tons of chloride ore, some of it working 700 ounces in silver per ton. The Juno belongs to a prominent merchant of San Francisco, and had lain idle for a long time until some miners obtained a lease on it, and proved it to be a good paying mine.

The Elkhart, a lead mine that was supposed to be worthless, has developed a four-foot vein of pure white carbonate and galena ore that carries gold and silver enough to net \$45 per ton, after paying shipping, hauling and smelting charges of \$35 per ton.

The Altola mine has produced several carloads of ore ranging from 100 to 125 ounces of silver and 25 per cent of copper. The Minnesota, after lying idle for 10 these many years, was leased and developed into an 18-inch vein of 600 ounce ore. The Ora Plata has been sunk 50 feet deeper, and a big body of 150-ounce ore struck below water level, but water runs the miners out, and now a pump and hoisting works are ordered.

The Night Hawk has been tapped by a tunnel below water level, and a foot of 350-ounce ore is the result. The American Flag is producing more ore, and even richer ore, than ever before, the last carload sampling 624 ounces per ton at the Pueblo works. I might keep on enumerating new strikes on old supposed worthless claims and improvements on some of the "old standbys" until it would fill many pages of the PRESS, but these few examples are enough to show something of the new life which has seized the mining men of this county and what good results are following it. When I say that, with only one or two exceptions, these new developments have all been made after passing through the base ore that underlies the chloride, and just below water level, it will be perceived what I mean by substantial development. Heretofore the miners, when they had extracted all the chloride ore from the surface, were compelled to abandon further development on account of water and the increased cost of sinking; but after some had managed to get through the iron belt at and below water level, others were encouraged to try, and in nearly every case success far beyond their most sanguine hopes has rewarded their labor and perseverance, and thus it is that old Mohave is rapidly coming to the front as a bullion-producer.

There are many other new developments in old claims within this county that are equally deserving of mention as those spoken of, but it would not be fair to intrude further upon your space.

HENRY P. EWING.

Chloride, Mohave Co., Ariz., Jan. 16, 1888.

**USE GOOD MATERIAL.**—In building machinery, no matter for what purpose or to what uses it may be applied, there is nothing in the experience of those who have devoted years to the business so prominent as their faith in the use of good material. The curse of many an establishment is to be found in what is termed "cheap" material. There is never any economy in substituting cheap for good. There is never anything gained by employing a cheap thing simply because it is cheap. For instance, never use brass when your judgment recommends gun metal. Whatever in your judgment is best, is the proper material to use.

**BUILDING TO SUIT THE FURNITURE AND CARPETS.**—In arranging the openings of a room, it is well not to forget the wall spaces. It is sometimes advisable to build a house to suit the furniture. Carpets are generally of certain uniform widths, and it would also be well when feasible to so regulate the width of the rooms as to have the carpets fit with as little waste as possible. The tenant will bless the architect who takes these matters into consideration in planning his dwelling houses.





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SAN FRANCISCO

Saturday Morning, Feb. 4, 1888.

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## Passing Events.

Abundant rain has fallen all over the State, greatly to the benefit of miner and farmer. All fears of a dry season have long since passed away. There is a heavy supply of snow on the mountains, insuring a good water season.

The completion of the great Merced canal is an important event. It is 27 miles long, cost \$1,750,000, and its completion will permit the irrigation of 600,000 acres of land. The canal is 10 feet deep, 100 feet wide at top and 70 feet at bottom. The lake or reservoir covers 640 acres; average depth of 30 feet.

There is great scarcity of coal at this port, which inconveniences manufacturers and domestic consumers. Prices of all kinds of coal are very high at present, and even at the high prices only small quantities can be purchased. The fire at the Wellington mines has decreased the already low supply.

We devote considerable space this week to a general review of precious-metal mining on this coast for the year 1887. The mining industry shows marked advancement all over the coast.

The Union Iron Works have removed their down-town office from 216 Market street to the northeast corner of Mission and First streets.

A GREAT soda manufacturing enterprise is to be started at Owen's lake.

The San Francisco foundries used 13,350 tons of pig iron last year.

## MINING OPERATIONS IN 1887.

Four Decades Since the Great Marshall Gold Find in California.

It is now just 40 years since the grand discovery of gold was made at Sutter's Mill in California, that event having occurred, as now seems probable, on the 24th day of January, 1848, and not on the 19th day of that month, as has heretofore generally been supposed. This change of date, in so far as it may be said to have been effected, is due to an entry made in a diary kept by Azariah Smith, who was at work on the mill at the time gold was found by James W. Marshall, this date finding some corroboration from an entry made about the same time by Henry W. Bigler in a diary kept by him, also Bigler having been a fellow-workman with Smith on the mill. We speak of Marshall's as being the grand discovery to distinguish it from other discoveries of gold that had occurred in California long before. But the deposits previously found were unimportant, having been comparatively poor and of limited extent. The first gold found in this State was discovered in 1775 at a place now known as Carga Muchacho, 14 miles west of Fort Yuma, on the Colorado river. Fifty-three years afterward another find occurred at San Isidro, in the western part of San Diego county. In 1838 placers were struck in San Francisco canyon, in the northwestern part of Los Angeles county, and were worked in a small way for the next 10 years. These were all placer deposits, though there is a tradition that some attempts were made in the interim at working gold-bearing quartz. All the gold gathered in California prior to 1848 did not probably exceed \$200,000, and may not have reached half that amount.

Much more might, and no doubt would have been collected, had not the Catholic priests, who were well aware of the auriferous character of the country, discouraged the business of mining as being inimical to their missionary labors. That the early Spanish settlers did not explore the interior in search of gold is explained by the fact that the back country was infested by hostile Indians, nor had these settlers any reason to suppose that these interior regions were especially rich in gold.

## The Year 1887.

Though not distinguished by the occurrence of any great mineral discovery or other specially notable event, the past year has, nevertheless, been one of the most satisfactory in the history of mining on this coast. In the first place the product of bullion has been the largest ever made. On this product the profits have been fair, and but for the extremely low prices ruling throughout most of the year for copper, silver and lead, these profits would have been unusually large. The year has seen fewer financial failures and, what is almost equally gratifying, fewer illegitimate schemes perfected than any of its predecessors, and this simply because the investors in mines are observing now more discretion and business sense than formerly.

Besides such exemptions from financial loss, the year has witnessed fewer grave accidents in the mines than usual, none notably disastrous to life or property having occurred. This exemption from serious casualties has been due mainly to the greater precautions taken by employers to guard against their occurrence, and in part to a growing prudence among the miners themselves. The new year, however, opens with a very holocaust, no less than 69 miners having on January 24th lost their lives by an explosion of firedamp in the Wellington coal-pit, British Columbia. But this calamity, though painful in the extreme, can hardly be attributed to carelessness, as no one suspected the presence of the deadly gas in this pit, which was by all considered the safest in the whole group of mines. Whether or not the accident might have been guarded against remains to be demonstrated. As yet no charge of neglect has been made against the management.

Speculation in mining shares, once a potent factor of mischief, has so far subsided that it may be said to have been practically eliminated from the business, operations of this kind being now confined mostly to regular dealers in stocks and to that class of gamblers who are bound to spend their spare money in this or some other game of hazard. Much of the investment now made in mining shares is with a view to long holding rather than making a quick turn or taking chances on a fluctuating market.

As in the past, a great deal of preliminary expenditure continues to be made throughout our mining regions. Much of this preparatory work is, however, now beginning to tell on the product of bullion, as denoted by its growth during the past few years. And this gains so made, it may confidently be predicted, are destined not only to be kept up but to undergo steady and it may be very rapid enlargement in the future. To our mineral deposits there is no limit; and if we keep on opening up and outfitting new mines, and improving our machinery and methods, a corresponding increment of bullion cannot fail to ensue.

## Freedom from Labor Troubles.

Of all our great industries none have been so little disturbed by labor troubles as mining for the precious metals. Strikes, whether for shorter hours, higher wages or other cause, have been comparatively infrequent and of short duration. The wages of miners have not been much diminished for the past ten or fifteen years. Varying with locality and the kind of work to be done, miners receive now from \$2.50 to \$4 per day of ten hours. The daily wages of good drifters and most underground hands are \$3 in California and \$4 elsewhere west of the Rocky mountains, the rate being somewhat less in countries further to the east. In the deep workings on the Comstock range, where the heat is great, and generally in other places where the ground is extremely wet or the ventilation bad, the miners are not required to labor more than six or eight hours per day or on two shifts of three or four hours each. Where miners work by the day they generally board and lodge themselves. Where they engage by the month, as sometimes happens, they receive from \$50 to \$75 per month, board and lodging included. When first introduced, the miners in most localities strongly opposed the use of giant powder and the single hand drill. But this opposition was not kept up very long, nor did it cause any serious trouble while it lasted.

## Quartz Mining

Continues to be the principal branch of gold-mining practiced in California, fully 65 per cent of the gold bullion produced in the State being obtained from the auriferous ores. Great improvements have been made of late in this branch of mining, ores that only a few years since were rejected as worthless, being now worked with profit. It is probably the case that we are able to handle as low-grade ore as can be done in any other part of the world.

If so, this establishes for our machinery and methods a manifest superiority over all others, inasmuch as labor and some of the other factors of production are much dearer here than in any other country, not even Australia excepted. As regards the item of labor, it is more than twice as costly here as in most European countries. If with such high-priced labor we can utilize ore of as low, or nearly as low, grade as can be done anywhere else, then our mechanisms and processes must be a long way ahead of those in use by any other people. This conclusion seems to us inevitable.

In no country do these new helps to mining so multiply as on the Pacific Coast, and more especially here in California. Not a month passes but some novel and really useful invention claims the attention of the mining public, to say nothing of the many that are neither new nor useful. One day the candidate for popular favor is of a mechanical and the next of a metallurgical character. Now it is a labor economizing and then a money or a metal-saving device, these contrivances coming in the shape of water-wheels, engines and hoilers; roasters and smelters; rock-breakers, ore-feeders and crushers; screens, amalgamators, concentrators, aprons, riffles, plates, and other gold-savers; nozzles and sluices; pumps, machine-drills, safety-cages and air-compressors, together with an infinity of explosives, all fearfully potent, and metallurgical processes without number. While many of these inventions possess little or no merit, a large percentage are really valuable and are not long in gaining acceptance on the part of the mining community.

With so much that is helpful we find it remunerative to mine and mill auriferous quartz in California that yields a total of not more than one dollar per ton. Where this is done all the conditions are, of course, exceptionally favorable: the ore is free milling, abundant, and easily extracted; the mine and mill are

close to each other, and the machinery is driven by water-power. The bulk of the quartz worked in this State yields from eight to ten dollars per ton, while the cost of mining and milling ranges from three to five dollars per ton.

Nevada and Amador remain the leading quartz-mining counties of the State, with Sierra not far behind. In these counties the largest production has been made, and there the greatest expansion of the business has taken place during the past year. In a dozen other counties, however, a marked progress has been made in this department of mining.

## Drift Mining.

Except in California, placer mining is not now extensively practiced in any of the Pacific States or in the Territories. In Alaska 90 per cent of the gold taken out is the product of vein mining. In British Columbia, while placer is about the only kind of gold mining much pursued, it does not nor has it ever reached there large dimensions. In Arizona, Oregon, Idaho, Montana and Colorado, where placer operations were at one time very extensive, they have now dwindled to comparatively small proportions. In neither Nevada, Utah, New Mexico, Dakota nor Washington Territory has much placer mining ever been done, the product of gold from this source being larger in California than in all these other counties combined.

The greater portion of the placer gold now obtained in California comes from the drift mines which are here worked on an extensive scale. The business has, in fact, been steadily growing for a number of years past, it having received a considerable impetus through the partial cessation of hydraulic washing. Much ground formerly worked by the latter method is now operated by drifting, though the profits realized are not now so large as they were before, owing to the much greater number of men that have to be employed. Here, again, California is the only country in which this style of mining is much practiced, because here, only, do we find the Pliocene system of channels much developed; it being along these that all the large drift operations are conducted. But for her "dead rivers" drift mining even in California would cut but a poor figure. Very little gold is taken out by drifting in either the extreme northern or the southerly lying counties of the State, because these extinct rivers are entirely absent or show there in only a feeble way.

The Forest Hill Divide, Placer county, Liberty Hill and vicinity, Nevada county, Little and Big Butte creeks and the Megalia ridge, in Butte county, and Forest City and Slate Creek Basin, Sierra county, continue the sites of the principal drift operations in this State, though some drifting is done in a majority of the other mining counties. The larger companies engaged in this business employ from 100 to 150 men, their annual output of gold ranging from \$100,000 to \$300,000. The net profits on this output, once the mine is opened and equipped with plant, vary from 40 to 60 per cent, the results in this kind of mining, so long as the deposits last, being comparatively free from contingencies. Neither drouth, frost nor storms affect drift operations. These being mainly carried on under ground, neither the heat nor the cold, however intense, is much felt, while there is always water enough in the course of the year, even in the driest season, for washing the gravel taken from the drift mines. Last fall many of the quartz miners in the central districts of this State lost fully a month owing to an insufficiency of water to drive their machinery, but none of the drift companies were through lack of water, precluded from washing the stock of gravel they had taken out during the summer, though a few of them were delayed with this work beyond the usual time.

Wherever an opportunity offers to locate any drift ground it is at once taken up and properly secured, and thus the area of these operations is every year enlarged or the foundation laid for its extension. During the past summer a large tract of land on the ridge between the north and the south forks of the middle fork of the American river was taken up, surveyed and put in shape for perfecting title under the general mining laws. This tract covers the upper sections of the rich and extensive Pliocene channels that traverse the Forest Hill divide, notoriously the most productive in



the State. During the course of the present year it is expected that this ridge will become the scene of active and profitable drift operations, as the "Dead River" here wherever prospected or eroded by the modern streams show themselves strong and prolific in gold. The locators are experienced drift miners and possess themselves means ample for exploiting their claims and working them in an effective way. With the companies operating at Damascus, Sunny South, Bath, Forest Hill and other old and well known drift camps further down the divide, the past has been an exceedingly prosperous year, the outlook with the most of them being at the same time highly encouraging.

Going north, we find drift mining being resumed in the vicinity of Dutch Flat, Liberty Hill, and about Nevada City, where this class of operations had for a long time been much curtailed, or wholly suspended. At the Darheo mine, a little further on, near North Bloomfield, the year has also been a good one. The Bald Mountain Extension Company at Forest City have for several years past been dividing large profits, as have also the North America Company, operating at Whisky Diggings, in the Slate Creek basin, not to mention a score or more of smaller companies owning and working drift claims in that portion of Sierra county. On the west side of Slate creek a strong company have located and are preparing to open by means of extensive tunneling nearly the whole country reaching from La Porte to Gibsonville, a stretch of eight miles, and which in the early day was occupied by hundreds of miners, who worked their small claims through vertical shafts. The auriferous channels here, though not generally large, are rich and very numerous. The probabilities are that this company will achieve a great success.

After an interruption of several years, owing to litigation, gravel is again being taken from the Pershaker drift mine on the Megalia ridge, Butte county. The auriferous channel covered by this claim, though narrow, has yielded as much perhaps to the area worked as any other in the State. Now that work has been resumed there, new life seems likely to be infused into drift operations along the entire gravel range, here very extensive. Owing to the extent of these buried channels and the success that has latterly attended their development, drift mining is destined to see a long life in California, not one-tenth probably of the original drift deposits having yet been exhausted. How far they reach under the lava flow that covers so much of the westerly slope of the Sierra Nevada can, however, only be determined by actual exploitation.

#### Hydraulic Operations.

By reason of adverse legal proceedings, have for the past ten years been undergoing steady contraction in California, until now they have ceased entirely in the central and more active hydraulic districts of the State. Only in a few of the more northern counties is the business any longer pursued; Trinity river, in Trinity county, the Salmon and the Klamath rivers, in Siskiyou county, and Smith river, in Del Norte county, including the confluents of these several streams, being the principal localities where hydraulic washing is now carried on. There being in these counties no farming lands along the outletting streams, nor yet any other properties or interests exposed to be injured by the hydraulic debris, this branch of mining has not there been interfered with, nor, for the reason stated, is it ever likely to be. Enjoying such exemption from judicial restraint, the business in these several counties has undergone gradual but steady expansion, its growth having been somewhat accelerated in consequence of its suppression elsewhere. In several instances, the enjoined miners from the middle districts have sought these northern fields, and, carrying there their enterprise and large experience, have re-established themselves successfully in the business, the facilities for prosecuting it being in most cases extremely good. Along the Klamath river the conditions for carrying on this branch of mining are especially favorable, the auriferous gravel deposits being extensive and the material of good grade; water abundant and capable of being brought on the mines under all needed pressure, and at small cost, while the fall below them is almost everywhere sufficient to prevent any troublesome accumulation of tailings.

The climate is also excellent and timber

plentiful, the greatest drawback being the cost of freighting in machinery and supplies, the most of which have to be carried for a considerable distance on pack-animals. This trouble is, however, being steadily diminished, and may be expected in the course of a few years to disappear altogether through the construction of wagon-roads and railways. As a good deal of capital is now being embarked in hydraulic mining in that region, the business there may be expected to undergo such enlargement in the course of a few years as will in some measure make good the falling off that has taken place in the districts farther south, though it can in no event wholly repair such falling off.

Like the drift, the hydraulic deposits of California are so very extensive that neither this nor the next generation will see them exhausted, even though the present injunctions were raised and unrestricted washing enforced to go on.

Outside of California no very extensive hydraulic operations are to be seen, the deposits being comparatively small, and the plant used in washing them of corresponding capacity. Although the business has nowhere else been suppressed by the courts, in none of the other Pacific States or Territories has it attained anything like the dimensions reached in this State, either as regards the apparatus employed or the production made.

#### The River-Bed Miners.

Favored by a long-continued stage of low water, were enabled to gather a rich harvest of gold the past autumn, some of the cleanups made along the Scott, Salmon and Klamath rivers, the sites of the largest operations in this line, having been especially large. This branch of mining, after suffering a decadence that reached through many years, has in recent times undergone some revival, the miners having, in some instances, sought new fields of labor, while in others they have returned and worked over the beds of the streams worked long ago. That it has been possible for them to repeat this task has been due to the extent to which this class of deposits has, through the influx of all kinds of mining debris, been able to renew themselves. As the life of river-bed mining will be co-existent with this reproductive process, it is destined to reach through a long period, though it must, after the original deposits are used up, necessarily undergo some declension. At present it is a prosperous industry, and such it will, very likely, long remain.

#### Bullion Output.

The product of bullion for the year 1887, amounted, according to the following report of J. J. Valentine, to \$104,645,959, being an increase of \$1,634,195 over the product of 1886. Comparing the product of the two years by States and Territories, the following are the losses and gains made during 1887 as established by Mr. Valentine's reports for these two years respectively: California, Nevada, Washington Territory, Idaho, Utah, Colorado, Arizona, West Coast Mexico and British Columbia, all show some falling off; while Oregon, Alaska, Montana, Dakota and New Mexico have made more or less gains, the greatest gain, \$4,643,275, having been in Montana, where it was due to the large output of copper made last year.

John J. Valentine, vice president and general manager Wells, Fargo & Co., has kindly furnished us with the following statement of precious metals produced in 1887:

The following is a copy of our annual statement of precious metals produced in the States and Territories west of the Missouri river (including British Columbia and receipts by express from the West Coast States of Mexico) during 1887, which shows aggregate products as follows: Gold, \$33,074,022; silver, \$51,678,113; copper, \$10,362,746; lead, \$9,631,073; total gross result, \$104,645,959.

As stated repeatedly, the facilities afforded for the transportation of bullion, ores and base metals, by the extension of railroads into mining districts, increase the difficulty of verifying the reports of the products from several important localities. Especially is this the case in the reports from Colorado and Montana. The general tendency is to exaggeration when the actual values are not obtainable from authentic sources; but the aggregate result, as shown herein, we think may be relied on

with reasonable confidence as approximately correct.

#### Annual Products of Lead, Copper, Silver and Gold in the States and Territories West of the Missouri River, 1870-1887.

Year.	Gold.	Silver.	Copper.	Lead.
1870	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
1871	1,200,000	1,200,000	1,200,000	1,200,000
1872	1,500,000	1,500,000	1,500,000	1,500,000
1873	1,800,000	1,800,000	1,800,000	1,800,000
1874	2,100,000	2,100,000	2,100,000	2,100,000
1875	2,400,000	2,400,000	2,400,000	2,400,000
1876	2,700,000	2,700,000	2,700,000	2,700,000
1877	3,000,000	3,000,000	3,000,000	3,000,000
1878	3,300,000	3,300,000	3,300,000	3,300,000
1879	3,600,000	3,600,000	3,600,000	3,600,000
1880	3,900,000	3,900,000	3,900,000	3,900,000
1881	4,200,000	4,200,000	4,200,000	4,200,000
1882	4,500,000	4,500,000	4,500,000	4,500,000
1883	4,800,000	4,800,000	4,800,000	4,800,000
1884	5,100,000	5,100,000	5,100,000	5,100,000
1885	5,400,000	5,400,000	5,400,000	5,400,000
1886	5,700,000	5,700,000	5,700,000	5,700,000
1887	6,000,000	6,000,000	6,000,000	6,000,000

STATES AND TERRITORIES.	Gold Dust and Bullion b3 Express.	Gold Dust and Bullion b3 vessels.	Silver Bul- lion by Ex- press.	Copper Bul- lion by Ex- press.	Lead and Zinc Bul- lion by Ex- press.
California	\$10,700,002	\$1,070,005	\$ 972,707	\$ 833,350	\$13,605,923
Nevada	2,900,002		6,365,647	2,285,843	10,823,463
Washington	500,000	300,000			500,000
Idaho	550,000	50,000	2,580,000	3,300,000	800,000
Montana	1,940,000	500,000		3,940,000	25,483,270
Utah	4,400,000	200,000	10,728,275	10,100,000	7,697,730
Colorado	13,910		6,049,000	6,574,730	23,253,000
New Mexico	4,200,000		6,480,000	11,913,000	5,223,000
Arizona	680,545	200,000	1,672,988	1,472,988	5,771,550
Dakota	2,882,320	200,000	472,285	3,817,050	3,058,605
Mexico (West Coast States).	11,801		744,234		7,023,035
British Columbia	556,154				556,154
Total	\$20,731,644	\$2,900,905	\$31,011,657	\$41,606,883	\$104,046,569



with the most scanty means and little assisted by others, developed and outfitted the property and brought it to its present large and profitably productive condition, and this under circumstances especially adverse, the mine being far from the railroad and located in a region but ill supplied with either wood or water.

Several of the mines in the Tuscarora district, 60 miles north of Elko, have shown steady, and one or two of them notable improvement during the year, this being one of the liveliest and most promising mining camps in the northern part of the State. The country lying along and adjacent to the Carson & Colorado railroad extending from Walker lake south over 100 miles into Inyo Co., Cal., has also become the site of numerous active and profitable mining enterprises since the completion of that road. This halt of country abounds with deposits of gold, silver and copper, but nothing could be done with them notwithstanding their known richness prior to the advent of the railroad.

The whole of eastern and southeastern Nevada, a section of the States abounding in like manner with valuable mineral deposits, remains practically an unpeopled desert, owing to a lack of cheap transportation facilities; and is destined so to remain till these are furnished, as they are likely soon to be through the construction of the projected Salt Lake and Los Angeles railroad, which as surveyed will traverse this region centrally. As this road when finished will connect with the Southern Pacific system, the benefits likely to arise from the development of that extensive country will be largely shared by San Francisco and the agricultural districts of eastern and southern California. Such being the case, it is much to be desired that this road will be early begun and rapidly pushed to completion.

### ALASKA.

Although there is thus far only one great paying quartz mine in the Territory of Alaska, the future of quartz mining there is very promising. What ledges have been found are generally of very great size, and although the ore is of low grade its abundance is such that plenty of money should be made. The great mine on Douglas island has yielded over two millions of dollars already, and this coming season will have 240 stamps at work constantly. The mill is one of the most complete in the United States, and is the largest of any. The ore may be said to be quarried out, so wide is the ledge. Preparations are now being made to open other deposits of ore of like character on the mainland and the outlying islands of the Territory.

The discoveries of gold on the Yukon and Stewart rivers have attracted the attention of miners during the past year, and considerable placer gold has been obtained. Gold has been found in many places. The long duration of the winters and the severity of the climate away from the ocean are drawbacks to working the mines. Moreover, there are no roads anywhere, and the nature of the country makes it a difficult one to prospect in the summer months. Those who have been to the country advise no one to go there who is not well supplied with money. It is a poor country for a poor man.

On the mainland, across the channel from the Douglas island mine, six miles back from the shore, is the Silver Bow Basin, where more or less mining is carried on. The altitude is so great that the winters are very long. These mines are tributary to Juneau.

Both coal and copper have been found, though little work has been done in any of these mines.

Numbers of miners went to Alaska in 1887, attracted by the success of the Douglas island mine and the reports of rich placers on the Yukon and Stewart rivers. Many of these returned to Portland or San Francisco to winter, and will go back to Alaska this spring. But a goodly number remained in the Territory during the winter, so as to be on hand early in the season.

The cost and difficulty of getting to the placer-fields, wet though they may be, will deter any great number of men from going there. But as it is well understood that the country has scarcely been prospected at all, and there are plenty of chances for good placer or quartz stakes, it will be a favorite field for prospectors for some years to come. What placers have been found are wet; but as before stated, no man should go to the region without a good supply of money, as there is very little chance for employment in case of "going broke."

### ARIZONA.

Arizona has not made a very satisfactory record during the past year. The long continued low price of copper caused the closing down of some of her best mines for months, thus reducing the value of the total mineral products of the Territory. These have again been started up, however, since the rise in price of copper. The Tombstone mines have been comparatively inactive. There have been few developments which call for special mention. The opening of the rich Howard mine has been the principal mining sensation. The details of this find have been published in the PRESS. The vein was not a new strike, but an old location with ores worth about \$25 per ton. In doing the annual assessment work the owners struck a wonderfully rich chimney of gold ore, and more has since been found.

Arizona badly needs capital for its mining development. It has never had any such chance

ss Montana and Colorado in this respect. It is not likely, however, that this state of things will continue much longer. The Prescott *Courier* says: The mining industry was very much depressed last year, and yet our miners added about \$7,000,000 to the metallic wealth of this world, raised the reputation of our mining-fields, until now capitalists and good miners are coming by the score to help in the development of our rich resources.

The new-comers are more than pleased with the mines and the country, and wonder why so few miners have, in the face of so many drawbacks, accomplished so much. They find fine mines in the midst of plenty of timber and are more than surprised to see for themselves that water is far from being scarce in what has been slanderously put down as a desert.

Their only objections are to owners of patented claims who, they say, do not care to work or lease them, and to so many prospectors holding valuable mines they will not or cannot work. These objections can and will be removed. Our districts are, we may say, unprospected, and richer ledges than any now known will yet be discovered. Our placer mines are unworked, and remain to reward capital and labor. Up to the present the *Courier* has not advised prospectors and miners to come here, but our winter is now almost over, and such people may "pack up" right away and come to Northern Arizona. If they cannot prospect in the elevated districts for a month or more to come they can prospect and work in several foothill districts. There was a time when, we confess, we were discouraged in regard to our mines; this was after the failure of many self-styled mill men to work our ores with profit. Most of these came here not to work ores for profit, but to work the pockets of those who sent them here, and hilk our people. The building of the railroad led to the starting of sampling works in Prescott. Both institutions have worked honestly and faithfully for mining success, which is happily achieved. Croakers have said that after the old dumps were exhausted there would be an end to the shipping of ore. They prophesied wrongly. The mines continue to yield more rich ore than can be transported, and so the good work goes bravely on.

In speaking of mining, the Governor of the Territory in a recent report says:

Taken in the aggregate the mining industries of the Territory are on a safe and promising basis. The speculative characteristics which too long marked this especial industry are fast disappearing, and that stable, economical, sound business prudence, which alone brings success, is taking its place. Mining for precious metals is just as legitimate a business as that of any other branch of industry, but it requires the same amount of care, judgment and intelligence, and when these essential requirements are ignored, failure and disappointment inevitably follow, to the general detriment of this, one of the most important and growing industries of the country. Owing to a lack of railroad facilities to cheapen the cost of transportation, very many of the most valuable mining properties of the Territory, of necessity, have not been worked. This is especially true of many of the mines of Northern Arizona, which produce a heavy percentage of base ore, and cannot be treated by milling process, and, therefore, need cheap transportation to be profitably shipped to remote points for treatment. Sampling works have been erected at Kingman, on the line of the Atlantic and Pacific railroad, and at Prescott, at the terminus of the Prescott and Arizona railroad, and at Tucson, on the line of the Southern Pacific road. Miners are now having their ores crushed, assayed and purchased at these points. This facility has given renewed impetus to mining in these localities, and is a healthful sign. Most of the mining claims are owned by hard-working, honest prospectors, whose only capital is strong arms and indomitable will. Now they can procure a "grub stake," work their claims, take out ore and pack it to the sampling works, receive payment and return to their work, ready to extract more. Not waiting for capitalists to come to their aid, they manfully labor, develop their own property and enjoy the profits.

This system must prove a new epoch in the mining history of Arizona. It insures the certain development of that great metalliferous wealth which lies hidden in every mountain range in Arizona, from its northern line at Utah to the southern boundary of Sonora. Arizona as yet is practically a virgin soil to the miner; her surface has only been scratched. Over \$15,000,000 of silver were produced by the three mines in the Tombstone district, at a depth of 600 feet and above water level. The famous Silver King mine, of Pinal county, yielded, as estimated, over \$7,500,000 in the past 11 years, and still promises better returns. The great Vulture gold mine, of Maricopa county, which is estimated to have produced some \$5,000,000 within a depth of 500 feet, for years past, has fed and is now feeding an eighty-stamp mill, and is worked day and night. These especially enumerated cases prove that while the "pay streak" of her mines may start at "grass roots," yet her grand ore hodies go down to the howels of the earth. Nature has indeed been lavish with Arizona in the distribution of her mineral wealth, and the day is not far distant when she will lead in her "output" of precious metals. Arizona is also rich in copper, and in 1884 ranked as a third producer of this valuable metal. Three thousand miles removed from the eastern seaboard, she has successfully com-

peted with lake copper. Her ore hodies are larger, and rich, averaging from 4 to 25 per cent, often carrying also a high percentage of silver. With increased facilities of railroad communication, cheapening of coke and transportation, and a fair price for copper, this especial industry must assume large proportions, giving employment to thousands of miners, and adding greatly to the wealth of the Territory.

### COLORADO.

Colorado still keeps the lead of all the mining States and Territories in amount of bullion production, although Montana is now beginning to "crowd" the Centennial State. In addition to its precious metals, Colorado produces plenty of coal and iron. The Denver *Republican* has compiled careful statistics of the production of the State, and we quote from an article in that paper:

The total value of the production for the year is placed at \$24,576,043.79, which is a little more than \$2,000,000 less than the amount reported last year. The value of the different metals produced was as follows in round numbers: Gold, \$5,000,000; silver, \$14,000,000; lead, \$5,400,000; and copper, \$240,000.

The average prices of silver and lead during the year 1886 were \$1.01½ per ounce for silver, and \$4 67½ per hundred for lead. During the past year the average prices have been 97 cents and \$4.50 respectively, and these prices have reduced the value of the product over \$1,000,000 below what it would have been at the quotations of the preceding year.

The production in detail, as reported by the different establishments, which gave their consent to a publication of their production, separate from the aggregate, and from all other sources, was as follows:

#### The Omaha and Grant Works, Denver.

Lead, 35,299,293 pounds at \$4.50.....	\$1,588,468 18
Copper, 726,400 pounds at 12c.....	87,168 00
Silver, 4,825,809 ounces at 97c.....	4,681,034 73
Gold, 58,965 ounces at \$20.67.....	1,218,808 20
Total.....	\$7,575,479 11

#### The Holden Works, Denver.

Silver, 2,181,683 ounces at 95c.....	\$2,072,551 54
Gold, 12,820 ounces at \$20.....	256,400 00
Lead, 19,481,577 pounds at \$4.50.....	876,296 54
Copper, 10,635 pounds at 10c.....	1,063 50
Total.....	\$3,226,298 58

#### Boston and Colorado Works, Denver.

Silver, 2,181,683 ounces at 97c.....	\$2,634,305 00
Gold, 36,235 ounces at \$20.67.....	748,386 00
Copper, 3,203,391 pounds at 12c.....	384,400 00
Total.....	\$3,767,091 00

#### Pueblo Smelting and Refining Co., Pueblo.

Silver, 1,701,190 ounces at 97c.....	\$1,650,154 30
Gold, 10,280 ounces at \$20.67.....	132,487 00
Lead, 11,589,306 pounds at \$4.50.....	521,518 77
Copper, 73,950 pounds at 12c.....	8,871 60
Total.....	\$2,294,032 27

#### Colorado Smelting Co., Pueblo.

Silver, 1,152,381 ounces at 97c.....	\$1,117,809 57
Gold, 5,002 ounces at \$20.67.....	112,010 00
Lead, 17,936,376 pounds at \$4.50.....	781,136 82
Total.....	\$2,010,956 39

#### Arkansas Valley Smelter, Leadville.

Silver, 1,222,419 ounces at 97c.....	\$1,185,746 43
Gold, 4,419 ounces at \$20.67.....	91,340 73
Lead, 15,002,000 pounds at \$4.50.....	675,090 00
Total.....	\$1,979,177 16

#### American Smelting Company, Leadville and Canyon City.

Silver, 1,159,202 ounces at 97c.....	\$1,124,475 94
Gold, 3,761 ounces at \$20.67.....	77,759 87
Lead, 16,836,541 pounds at \$4.50.....	825,144 34
Total.....	\$2,027,380 15

#### Harrison Reduction Works, Leadville.

Silver, 1,007,455 ounces at 97c.....	\$ 977,231 35
Gold, 6,771 ounces at \$20.67.....	139,956 57
Lead, 10,856,521 pounds at \$4.50.....	488,543 44
Total.....	\$1,605,731 36

#### Manville Smelting Works, Leadville.

Silver, 368,672 ounces at 97c.....	\$ 356,611 84
Gold, 2,824 ounces at \$20.67.....	58,372 08
Lead, 5,095,130 pounds at \$4.50.....	229,325 85
Total.....	\$ 644,309 77

Product of other smelters in the State.....	\$ 3,000,000 00
Yield of Colorado stamp-mills.....	1,100,000 00
Product of placers in Colorado.....	400,000 00
Sold to manufacturers.....	75,000 00
Sent to other places.....	325,000 00
Total.....	\$90,031,056 79

Amount produced from other States and Territories.....	\$5,194,073 00
Amount duplicated in smelter returns.....	260,940 00
Deducted from total.....	\$5,455,013 00
Colorado's production, 1887.....	\$24,576,043 79

Probably the most noticeable feature in connection with the year's progress in mining is the introduction of economical mining methods. The prices of lead and silver have compelled mine managers to adopt all possible means of economizing, and the result must be of marked benefit to the industry. There is much more yet to be done in this way, for the tenderfoot and incompetent mine manager is not yet a rarity.

Leadville still retains its leading position, as was to be expected, as the chief ore-producer. The total production of the camp during the year is placed at 350,000 tons of ore, including the silver-bearing iron ore. None of its larger mines have been exhausted, while several new producers have been added to the list, and the amount of ore reserved developed, awaiting extraction, is larger than one year ago.

Chaffee county shows great progress, especially in the Chalk Creek district, embracing the Murphy group of mines. Monarch district

of this county held its position as the second largest ore-producing region in the State until the railroad reached Aspen, and shipments began from that point in November. Monarch now stands as the third producing district in the State. The Madonna of this camp has during the past year shipped less than 15,000 tons of ore, against 40,000 during the preceding year, but the Eclipse of the same camp has increased from a small production to 36,000 tons.

Pitkin county, embracing the Aspen mines, has more than fulfilled all that was reasonably expected of it in the way of development. Immense bodies of ore have been disclosed on Aspen and Smuggler mountains which are awaiting the completion of work necessary for their most economical development or the settlement of litigation involving the ownership of the properties in which they are found. The extent of country containing large hodies of ore is found to be considerably larger than was known to be the case one year ago, and the end is not yet reached. Since the commencement of ore shipments by rail from this camp on Nov. 2d they have averaged over 180 tons daily. This amount has been taken mostly from reserves that lay upon the dumps and from ore hodies which have been disclosed during the past few months and were not known one year ago. The vast reserves standing in the great mines of Aspen mountain have not been touched.

The Battle Mountain district of Eagle county shows more ore than one year ago, though no effort is made to push production. The principal mine of the mountain, whose ore in sight is estimated at from \$2,000,000 to \$4,000,000, has lain practically idle awaiting a sale. It has just begun shipping, and the daily product of the camp averages about 60 tons.

The peculiar ore deposits in quartzite show no signs of exhaustion, and are, if possible, more of a puzzle to geologists than they have ever been. Development indicates that the ore-bearing horizon there is more extensive than was supposed.

Boulder county has exhibited more life than for many years. The Caribou mine has been started up after a long period of idleness and that silver camp is in a prosperous condition. Ward district, which is a gold-bearing region, is doing more and producing more profit than it has produced for years. The same can be said of every portion of the county.

Gilpin has disclosed some rich and profitable ore hodies in regions which have been devoted exclusively to growing oats and potatoes for 20 years past. Old mines have been started up for systematic production and new ones are undergoing development. It has been an unusually prosperous year for this pioneer gold district.

Summit county on account of its gold deposits in the neighborhood of Breckenridge has been unusually active, and has increased its output as well as opened the way for a larger increase during the coming year.

Gunnison county has got pretty well out of the feverish stage incident to a great boom and its mines are passing into the hands of men who are able and willing to work them for the profits obtained in legitimate mining. The Sylvanite mine near Gothic is the present noted property in the county on account of a large production of native silver. At White Pine, on the Tomichi, the May contact has passed into new control and will again become a noted producer. The Eureka of the same camp is undergoing development and showing large reserves, while other properties in the same region are coming out from a long sleep. On Rock Creek very important developments have been made, insuring a large production from this region in the not distant future.

The San Juan country, except in Ouray and San Miguel counties, has shown no marked improvement. Shipments from Silverton have fallen off about 2000 tons.

There are now in blast in the State about 50 water-jacket silver-lead stacks, having a daily capacity of about 2000 tons, in addition to the six or seven reverberatory furnaces at Argo. In addition there are about 35 calcining furnaces constantly in use. Some decidedly important improvements in furnaces have been made during the year which mark a long step in advance in the science of smelting.

Great advances have been made in this method of treating ore during the year. At Leadville some immense mills have been erected, all using jigs and slime-helms, with various kinds of sizing appliances. The capacity of the mills now working in Leadville is about 800 tons daily.

During the year a great advance has been made in the method of concentrating the tailings from stamp-mills. A simple and cheap machine has almost universally taken the place of the various kinds of helms, huddles and tables lately in use, and the increased saving reported varies from 5 to 25 per cent.

Altogether, the year was one of substantial progress in all that relates to the well-being of the mining industry, while the new year is ushered in with promise of increased production.

### IDAHO.

Idaho is making good progress in mineral development. It is an extensive mineral region probably not half prospected yet. Its most important section is that of Wood River, which embraces an area of some 75 miles in length and of the same width. There are several good mines and many undeveloped prospects. Only high-grade ores are being worked, high freight



rates keeping mines with low-grade ore in the background. A summing up of the mining industry of that section was lately presented to the Hailey Board of Trade as follows: The undersigned, your Committee on Mines and Manufactures, beg leave to submit the following report: During the year ending December 31, 1887, there were shipped from the city of Bellevue 17,823,954 pounds of ore, and from the town of Hailey 7,031,859 pounds, making the ore shipments from Hailey and Bellevue, in the aggregate, 24,855,813 pounds, or 12,429 tons, and from the Ketchum sampler, not including the Philadelphia & Idaho Company's works, 1528 tons, making a total of 13,957 tons (exclusive of the Philadelphia & Idaho Company's works). Taking 13,957 tons at an average of \$150 a ton, the amount reaches \$2,093,550 gross; from this sum there was paid to the Union Pacific Railroad Co. \$20 a ton for freight, amounting to \$279,140, and to the different smelting and refining companies which purchased the same, \$14 per ton, amounting to \$190,398.

The Salt Lake Tribune says: While the production of the great Wood River country for the past year was not so great as its mine-owners anticipated at the beginning of the season, it was large, and considering the circumstances of high waters in the spring and other retarding influences, the output was rather satisfactory. The work of the three samplers, Bellevue, Hailey and Ketchum, show 24,861,049 pounds of ore handled the first 11 months of the year. December was a light month, but would add enough to bring the grand total up to 26,000,000 pounds, aggregating 13,000 tons of ore. The amount of metals in this ore could not be ascertained, but taking what is understood to be the average value of Wood River ore, and it would make about 6000 tons of lead and 1,400,000 ounces silver. Besides this, the Philadelphia & Idaho Co. smelted large quantities of ore at their Ketchum plant, of which figures were not given. While the country has its divisions into various camps, the district as operated really embraces Bellevue, Hailey, Ketchum, Bullion, Gold Belt, Smoky, Boulder, Sawtooth, and a number of other localities, the names of which are common in speaking of mining affairs.

Prior to the starting of sampling work at Bellevue over one year ago, all the sampling for that immediate locality was done at Hailey. Since then it is done at Bellevue, and the ore is also shipped from there, but it is reported through the head office at the Hailey sampler, the two belonging to the same owners, and yet the Bellevue sampler did the greater portion of the sampling.

It was impossible to get full reports of the ore sampled by these two mills for the entire year, but their work for the first 11 months reaches a near approximation, as during December the shipments were very light. Some of the mines named sent portions of their ore to the Ketchum smelter, hence to get their actual output in pounds the two reports require consolidation in some particular cases. Only such mines as produced a number of tons any one month are named among the 33 in the list, while the smaller ones are hulked at the end. Following is a list of ore sampled at Hailey and Bellevue from Jan. 1 to Dec. 1, 1887:

Name of mine.	Pounds ore.
Mine Moore.	11,019,888
Ore of the Hills.	4,222,748
Idahoan.	3,748,215
Tyrannus.	250,652
Carrie Leonard.	244,619
Light (lease).	141,782
Mayflower.	357,759
Stormy Galore.	158,991
Nettie (lease).	156,665
Snow Fly.	150,374
Emery.	149,083
Nay Aug.	132,895
King of the Hills.	122,187
Overland.	107,748
Idaho Democrat.	98,911
Relief.	86,569
Narrow Gauge.	81,151
Jumbo.	81,083
Red Cloud.	81,083
King of the West.	49,033
Yankee Blade.	47,768
Bay State.	44,070
Abbie.	43,905
O. K. (lease).	43,716
Mountain View.	39,625
Elkhorn.	40,374
Bullion (lease).	33,298
Amicus.	32,474
Colorado.	32,474
Montana.	19,186
Argent.	9,199
Oriental.	6,404
Parker.	439,318
Small properties.	22,329,877

Total. 11,414 tons and 1877 pounds. The value of these ores was probably about \$1,400,000.

#### Ketchum Sampler.

During the past year the Ketchum Sampler handled ore from a large number of small mines scattered over the Wood River, Smoky, and other districts. Its business is represented by the following figures:

	Pounds.
Carrie Leonard.	1,006,000
Elkhorn.	478,000
Sundry mines.	1,572,000
Total.	3,056,000

Or 1528 tons of ore.  
Little Wood River, or Muldoon, has been neglected of late, the smelter lying idle. Smoky district made a decided advance. The King of the West yielded \$70,000. The Silver Star, Carrie Leonard, Tyrannus, Stormy Galore and Dollarhide are the principal mines. Considerable work was done at Sawtooth, but the closing down of the Vienna had a depressing effect. The Salmon River country embraces Chablis, Bay Horse, Clayton, Custer and Bo-

naaz. The Boardley, Ruinstorm and Skylark are prominent mines. The Yankee Fork country made more progress the past year than is generally known. The past history of the Gen. Custer mill and the mines belonging to that company is one of steady productiveness during the eight years since the company began operations. The Custer mine was a marvelous deposit on the surface, like a wart on the mountain, from which millions in value was quarried off before getting beneath the surface. The slide rock from this mine was the first to send ore out on pack animals, and led to the erection of the 20-stamp mill, which has since been increased to 30. That mill since February, 1881, has produced bullion to the value of nearly \$4,000,000, most of which came from the mines belonging to the company in the following rotation: Custer, \$2,700,000; Unknown and Summit, \$700,000; Badger, \$250,000; Lucky Boy, \$200,000; and other properties bringing the product up to about the sum stated. The mill is now shipping bullion to the value of about \$30,000 per month, and when their late purchase—the Continental—is fully opened this amount will be increased materially. The past summer ample preparations were made by the company to continue work right along and add much to the output.

The Charles Dickens, Washington, Paradise, Hidden Treasure, Fraction and other mines are prominent.

The old camp of Rocky Bar made a good record as a gold-producer during the last five months of the year. The Alturas Gold, Limited, Company, a London corporation, started their fifty-stamp mill in December, 1886, but up to June of the past year did not get down to good work. About that time there was a change in management and the property has been placed on a paying basis since then.

At the Boise City Assay Office \$920,933 were deposited in gold in 1887.

The Inter Idaho says: Everything looks favorable for such an increase in population, wealth and general development in Idaho next year as she has never before seen in a single season. Her mining districts have all made a great stride forward during 1887. The phenomenal growth of Wood River shows no signs of diminishing. On the contrary, it looks probable that what has been done is but a small beginning of what the next few years will bring us. The new lead belt, near Era, is already attracting wide attention, and next year may show that it is a second Leadville. Sheep Mountain gives promise of making a great stir next year. There are those who believe it will create an excitement not far behind that of the Cœur d'Alene country. Still others think that next year's greatest boom will be in the region about Salmon City. It would take a column to enumerate the districts throughout Southern and Northern Idaho whose developments during the past year have been very flattering.

In the Cœur d'Alene country developments on lode claims have gone on steadily. The Bunker Hill-Sullivan mines yielded \$567,000 for last year in lead, and silver, \$256,500. The Sierra Nevada yielded \$40,000. On the upper south fork there is a very large number of producing mines. The mines of the north fork of the Cœur d'Alene have by no means kept pace in development with those of the south fork. The placer yield of the Pritchard, Tiel, Beaver and the tributary streams and the old wash is reckoned to amount to \$150,000 for the year.

Of the developed quartz mines, the best known are those belonging to the Idaho, Golden Chest and Golden King Companies, all Eastern organizations, with the Occident, Treasure Box and Mother lode claims, which are owned by residents. The three former have mills, the three latter are stratas. The former are not paying, while the latter are. It is impossible in the brief space at disposal to even mention the names of the mines and claims of this region, the wealth of which is only now becoming properly recognized.

#### MONTANA.

No mining region has made such great strides within the past few years as Montana, and this has been principally due to the wonderful productiveness of the mines of Butte. That camp contains the most remarkably productive group of mines in the United States. After the exhaustion of the famous placer mines in Alder gulch, Montana attracted comparatively little attention from mining men. It was sparsely settled, there were no railroads, and little capital was invested in its mines. Since the discovery of Butte, however, all this has changed. Capital has been attracted to the country, railroads have been built, and rich mines opened and developed. The mines of Butte employ a great number of men. Miners' wages are \$3 50 per day, laborers and top-men receiving \$3, and timbermen, engineers and other skilled workmen from \$4 to \$6. The average wages paid by the mining companies, therefore, is \$100 per month. Following is a list of the employing companies and the amount of their pay-rolls per month:

Company.	Men Employed.	Average Pay-roll.
Anaconda (smelter included).	1500	\$150,000
Alice.	350	35,500
Lexington.	300	30,000
Moulton.	100	10,000
Bluebird.	300	30,000
Silver Bow.	250	25,000
Colorado.	300	30,000
Boston Con.	200	20,000
Butte Reduction Works.	50	5,000
Clark Properties.	250	25,000

Chambers' Syndicate.	300	30,000
St. Louis Company.	75	7,500
On Leased Mines.	200	20,000
Cora.	25	2,500
Miscellaneous.	500	50,000
Totals.	1700	\$170,000

The above figures we take from the Butte Inter-Mountain holiday edition, a splendid number, devoted to the interests of that camp. We quote extensively from sundry articles published in that paper. Following is the amount of the precious and base metal output of Butte for the year 1887, as nearly as it can be ascertained from official and semi-official sources. It will be seen that the increase as compared with the product of 1886 is almost \$3,000,000:

Silver by Union Pacific Express.	\$5,720,000
Anaconda, \$2,000,000 pounds copper at 10c.	5,000,000
Parrot, 10,000,000 pounds copper at 10c.	1,000,000
Clark's Colusa, 7,200,000 pounds copper at 10c.	720,000
Clark's Colusa, gold and silver.	600,000
Colorado, copper and silver.	83,000
Boston Con., 1,500,000 pounds copper at 10c.	150,000
Boston Con. silver.	42,500
Butte Reduction Works.	432,000
Butte Sampling Works, silver and gold.	300,000
Silver in matte (estimated).	1,000,000
Total.	\$16,143,500

The number of stamps now in operation in Butte by the several mining and milling companies is as follows:

Bluebird.	60 stamps
Lexington.	50 "
Moulton.	40 "
Alice.	80 "
Silver Bow.	40 "
Baxter.	10 "
Baltimore.	15 "
Old Lexington.	10 "
Total.	340 stamps

These 340 stamps crush an average of one and a half tons of ore per day, per stamp, depending somewhat on the hardness of the quartz. Altogether this amount of silver ore treated by the milling process in Butte per day exceeds 500 tons, or 15,000 tons per month. During the year 1887 10 stamps have been added to the Silver Bow mill and 20 to the Bluebird mill.

In addition to the above list of stamp-mills in operation in Butte may be mentioned the following mills in running order in other parts of the Territory:

LOCATION.	COMPANY.	STAMPS.
Deer Lodge County, Granite Mountain.		70
" "	Hope.	10
" "	Anaconda.	60
" "	Black Pine.	10
" "	Cab's.	30
" "	Pyreness.	10
Lewis and Clark Co., Drummond.		10
" "	Jay Gould.	10
" "	Empire.	75
" "	Gloster.	80
" "	Sterling.	10
Jefferson Co., Elkhorn.	20, Belmont.	50
Madison County, five gold-mills, total.		50
Miscellaneous.		50
Total.		635
Add stamps in Butte.		340
Grand total in Territory.		975

In addition to the stamp-mills above enumerated, there are in operation in Montana the following great smelting plants:

LOCATION.	COMPANY.	CAPACITY TONS.
Silver Bow County, Colorado.		25
" "	Clark's Colusa.	150
" "	Parrot.	350
" "	Boston Con. (old works).	150
" "	Butte Reduction works.	100
Deer Lodge County, Anaconda (when completed).		3,000
Beaverhead County, Hecla.		200
" "	Tascara.	25
Jefferson County, Helena M. & R. Co.		30
Gall, in County, Minneapolis & Co.		40
" "	Republic Mfg. Co.	40
Total capacity.		4,430

Many of the mills and smelters above enumerated have had their capacity greatly enlarged during the past year, and others are contemplating many improvements during the year to come. The Boston Con. will probably build an entire new plant; the lower works at Anaconda, designed to treat silver and lead as well as copper ores, will be completed; the Wickes works will either be enlarged or torn down and rebuilt, and a number of other big reduction enterprises now under consideration will soon be perfected.

The famous Alice mine, after running continuously since 1876, hung up its stamps in September last, on account of the Union Pacific R. Co. refusing to reduce the cost of transportation of milling salt to \$7.50 per ton. The account of these differences has been given in the PRESS. In addition to the Alice and Magna Charta mines the company owns several others. During the past year the company kept its mills in operation for nine months, reducing 28,000 tons of ore, against 39,870 in 1876. The total ore production during the past six years is 200,000 tons of ore, while 440,000 tons of waste have been hoisted. The bullion production of this company during the nine months of operation was \$632,277.23. The Moulton mine, a dividend-payer, produced some \$500,000 last year. The Lexington produced from \$60,000 to \$70,000 per month, partly from custom ore. The dividend received of this mine is \$565,000. The Mountain View, Colusa and West Colusa, with other properties of less prominence, have been consolidated into the Boston Cons. Co. An extensive concentrating and smelting plant has been determined on.

The plant of the Anaconda mine is as complete as enterprise and money could make it. The upper or main smelting works consist of four large buildings from 300 to 500 feet long and 100 to 200 feet wide. These are the concentrators, two smelters and matte-house. In these buildings they treated 1200 tons of copper ore per day in 1887. There are 26 furnaces, the combined product of which in matte is 140 tons, carrying uniformly 65 per cent copper. The new works, one mile below, will have 32

matting furnaces, or 56 in all. It is said the company will this year discard the usual ore-crushing appliances and use ten Ball steam-stamps, each with a capacity of 250 tons per day.

The copper product of the Anaconda Co. for the year 1887 from the upper works is stated by the company's chief representative to be 26,000 tons, or 52,000,000 pounds. This is about double the product of last year. It is within 3,000,000 pounds of the total product of the camp of Butte for 1886. It is estimated that the product of the new works will be limited to 8000 tons of fine copper per annum, making the total annual production of the company hereafter 34,000 tons, or 68,000,000 pounds. This will exceed the production of any copper region on the globe with the single exception of Spain.

During 1887 the company used 73,000 tons of coal and 48,000 cords of wood. The former comes from the Union Pacific mines in Wyoming, and the latter is flumed from the contiguous timber districts to the railroad, and thence hauled to this smelter. The contract under which this wood is being delivered calls for 300,000 cords.

The matte shipments of the company are about 140 tons per day, mainly to Baltimore and Liverpool. The company pays the railroads for freight on ore, matte, fuel and supplies \$75,000 per month, or \$900,000 per annum. It is estimated that the Anaconda Co. will furnish in 1888 65 per cent of the entire tonnage of the Union Pacific, Northern Pacific, and Montana Central to and from the cities of Butte and Anaconda.

This great property is owned mainly by Mr. J. B. Haggins of San Francisco, Cal., and Marcus Daly is general manager.

Among the great mining and smelting enterprises of Butte, the Parrot ranks second only to the Anaconda. The average amount of ore treated is 250 tons daily. Its plant is the most perfect in Montana, and its product is pig copper assaying 98 per cent, produced by the Manhes or Bessemerizing process. The Parrot mine is 600 feet deep and in a splendid state of development, having a productive capacity of 500 tons daily. Clark's Colusa concentrator and smelter has a total capacity of 200 tons daily. It has two blast and two reverberatory furnaces, and has worked continuously during the year on copper, silver and gold ore. The Butte reduction works is a comparatively new enterprise, with one 100-hp furnace which has made a splendid record for the year.

The great mineral-fields of Montana are located in the Rocky mountains, which cross the Territory from north to south near its western end. Thus the counties of Madison, Beaverhead, Silver Bow, Deer Lodge, Missoula, Jefferson and Lewis & Clarke contain the mighty deposits of ore which have made Montana so famous as a mining region. The northern and eastern counties are noted chiefly for their agricultural and stock-growing resources.

The Drummond is one of the famous mines of Montana. We recently gave in the PRESS a full account of the condition of this mine, and of its remarkable bullion yield, so that it is not necessary to again refer to it. In 1887 it earned dividends of \$1,500,000 out of a total product of \$2,500,000. The ore carries silver-gold.

The famous Granite Mountain, which pays \$200,000 a month in dividends, is a silver mine. The Drummond, Granite Mountain and Anaconda are the three most famous mines of Montana. There are hundreds of lesser mines in the Territory which, for the amount of money necessary to operate them, are equally pre-eminent to their class, and which are yielding a fully proportionate product. Among these may be mentioned the great Bluebird, the Beton consolidated properties, the Parrot, the Moulton, Lexington, Chambers syndicate properties, the Pollock, Gagnon, Silver Bow Company's mines in Butte, and the Hecla mines at Glendale, the Alta at Wickes, the Cahle mine in Deer Lodge county, the Jay Gould, and many others which could be named, each of which is a great treasure-vent. Such mines are self-developing. They pay a continuous profit and they are not for sale. But there are many thousands of mines in the Territory of equal promise, though less development, which are for sale. They are mines in which the work requires expensive machinery; or where the ore will not stand custom rates, but would pay handsomely if it were treated by the company owning such properties; or where transportation facilities are limited and need improvement; or where the ore is low grade and requires concentration, or where a great plant is necessary to secure the best results.

Mr. Spruille Braden, the superintendent of the United States Assay Office at Helena, furnishes the following statement of gold and silver deposited during the year 1887 at that institution. The standard ounces of gold were 71,114,639, and of silver, 36,222 35, their value for the several months being as below:

Months.	Gold value.	Silver value.
January.	\$85,108 80	\$1,425 47
February.	248,200 41	505 38
March.	243,352 63	324 55
April.	66,888 91	872 78
May.	95,009 74	6,503 20
June.	78,932 85	2,270 65
July.	95,052 89	1,602 26
August.	161,070 43	3,647 64
September.	248,532 51	7,397 98
October.	135,842 48	3,318 95
November.	217,172 70	5,047 37
December (apx.).	108,586 52	2,623 61
Totals.	\$1,323,060 26	\$31,606 79
Total value gold and silver.		\$1,354,667 05



## NEW MEXICO.

New Mexico stands credited this year with a total hillion product of \$4,229,234, as against the sum of \$3,821,871 in 1886. This shows some increase, though the figures do not really indicate the advance in the mining industry. The condition of affairs there is better than ever before. The Socorro *Bullion*, in speaking of this, says: "Though the prospector's campfire has gleamed from every mountain side and his pick and shovel delve the earth in quest of golden treasure, yet the vast resources of this Territory are scarcely realized by the oldest inhabitants. In his eagerness to come upon a second Golconda, the prospector often treads under foot mineral which, if properly treated, would make him rich returns. Here, then, has been our mistake in the past. We have discarded good things in the hope of obtaining better, and the old ground has now to be gone over a second time. The eyes of the miner are at last opened to this fact, and the dawn of prosperity is at hand." Reports from every camp confirm these statements, abandoned claims are again being worked and with success; money is now spent freely on mines which were once considered of little value. Wealthy St. Louis and other Eastern companies are investing in New Mexico mining property, and a general feeling of confidence is established. The tendency has been to sink a few feet and then make no further effort to develop other than to keep up the assessment work. This year, however, nearly all mine-owners are arranging to push to a depth of several hundred feet, and we may reasonably expect that good results will accrue from these renewed exertions."

The New Mexican papers are not satisfied with Mr. Valentine's estimate of hillion product. The *Silver City Enterprise* says: "Julius Wagner, local agent for Wells, Fargo & Co. here, states that he on application furnished Mr. Valentine with the amounts of raw ore and hillion shipped from railroad points in this county which he had collected and which in the aggregate are as follows:

Gold (hillion and dust) ..... \$ 147,800  
Silver bullion ..... 279,434  
Base bullion concentrates, etc., by freight. ... 3,769,000  
Total for county ..... \$4,176,234

"According to Mr. Valentine's report, the total output of the Territory is but \$4,229,234, or but \$50,000 more than that of Grant county alone. There is beyond question some mistake if Mr. Wagner's figures are anywhere near correct, and there is no reason to believe they are too large, as it has been discovered that he has overlooked several important shipping points in his compilation of the county output. The shipments from Whitewater Station, Florida Station, Gage, Gold Hill, Stein's Pass, Tres Hermanos and Lordsburg were overlooked in the report, and as a considerable amount of raw ore was shipped from these places, the output will certainly reach \$5,000,000. The Socorro smelter output for the year was 4,319,455 pounds of base hillion, containing

208,399.27 ozs. of silver value ..... \$201,724.40  
607.48 ozs. gold value ..... 12,149.35  
4,305,276 lbs. of lead value ..... 189,726.00  
Total value of gold, silver and lead ..... \$403,599.85

"The output of Sierra county has certainly been much larger than that of any other county in the Territory, as any person familiar with the outputting mines can attest. But admitting that these figures are in the abstract correct, the output, not including Sierra county, should be in round figures \$4,582,833.85."

The same paper in speaking of mining progress there, says: "The progress that the mining industry of this county has made during the past two years, if we stop to consider it, is truly wonderful, and especially is this true of Pinos Altos. Since the year 1860 the mine-owners of this camp have been satisfied apparently with chloriding and gophering around on the surface of the lead mines, not caring to penetrate the base metal which usually comes in at a depth of from 25 to 200 feet on the prospected veins. It remained for Peter Wagner, a man well known in this community, to demonstrate the fact that the wealth of the camp lay in its base metal and not in the surface or free-milling ores, beyond which the old-timers dare not penetrate and on which many of the best mines had been worked out. The sulphur, antimony, zinc, copper, lead and iron contained in the base metal found in all the leads at various depths seemed to deter mining and milling men alike from attempting to successfully treat it, but after the experiments of Mr. Wagner in concentrating the base metal and catching the gold on plates, the problem was successfully solved. Machinery for crushing the free-milling ore had long and successfully been used, but not until the Bell & Stephens and Wagner mills commenced treating the sulphurets did the camp begin its present prosperous boom. The decrease in the output of the alluvial mines during the past three or four years is due to the fact that the dirt has been worked over many times and that the mills necessarily consume a large amount of the limited water supply. Twenty years ago there were 31 stamps running on the free-milling ores of the Pacifics, Minnie Grande and Deep Down veins—the three most important leads that traverse the mineral belt of the camp. These stamps were hung up and abandoned many years ago and the camp dropped into a lethargic state that it has taken years to overcome. At the present time there are 30 stamps dropping in the camp and by the close of this year there will be at least 60, if the enterprise now being pushed through by the three St. Louis companies, namely, the Mountain Key, Deep Down and Pacific, is carried to completion. At present the principal and best paying mines are the Mountain Key, Deep Down, Asiatic, Wagner and O. Ceola. There are many others producing ore which will eventually be treated at one of the mills of the camp."

As to the mines of Organ the Rio Grande *Republican* says: "Everything goes to show that the Organ mines are taking on a new lease of life which is of a healthier nature than any yet experienced in that camp. It has, like most other camps, experienced a regular ebb and flow from the time of the first discovery of the mines, and in fact this is the history of every mining camp, however rich. All summer, while the valley has been attracting so much attention, the mines at Organ lay dormant to outside appearances, but a few men were still delving the great hills, and now it seems that the eve of prosperity has come to reward them for their faithful labors."

The Stephenson, which has been locked in litigation, is about to be reopened. Among other good mines are the Bennett, Little Rock, Crescent City, Black Prince, Grey Eagle, Copper Duke, etc. Prof. Chas. Longmense, ore-buyer for the Rio Grande Smelting Co. (Billing) thinks the Organ one of New Mexico's most productive ranges, and looks for future strikes of considerable magnitude and steady yield. The lead deposits to the north will in time be developed and prove of great value. To take it all in, the camp is in as healthy a condition as it has ever been since it has been under his notice."

The *Shaft*, published at Kingston, speaking of that camp says: "Our mines generally never looked better. The Caledonia, Comstock, Black Colt, and in fact the entire Bonanza hill and the North Percha country never looked better. Even the Grey Eagle keeps 'coming up.' It is true that mines are often found by accident. Nature has been lavish of her rich stores in our chain of mountains, and whether the existence of valuable mines is the result of accident or patient prospecting, the fact has been established that a large mineral belt exists many miles in length and of considerable width in which rich ore deposits exist."

This Black Range belt, which includes the mines in the vicinity of Kingston, has been ascertained to be nearly 50 miles in length, and to be nearly continuous the whole length."

The Lake Valley mines are situated at the southern extremity. These mines have produced several million dollars. Then passing the Tierra Blanco, where the recent strikes have been made, the Trojillo to the Grey Eagle on the South Percha, and passing the Enterprise group to the Carbonate, Midnight, and others, on the Middle Percha, adjoining the Illinois and Brush-heap group; the Louisville, Ironad group, the Eclipse and Satisfaction then follow in direct line on this belt. The Uncle Jack and General Jackson, which have produced good ore, at present are the connections belonging to the ore-producing formation. Then follows the Iron King, a good producer. Here are the Miner's Dream, Mountain Chief, Black Colt, Comstock, Lady Franklin, Caledonia, Superior and others."

As to the mines of Grant county the *South-west Sentinel* has this to say: "This year starts off very encouragingly as far as the mines of Grant county are concerned. In nearly all the camps of the county great activity is being displayed, and especially is this true of Pinos Altos. The prospect that the Santa Rita copper mines will start up adds to the encouragement which is shown in all parts of the county. Mines which have been idle are being started up under the lease system, and considerable prospecting is being done by conservative miners. The additions which have been made to the facilities for treating ores in this county during the past year are deserving of notice, and show that there is being rapid progress made in the development and working of the mines of the county. The capacity of the plants in the county has been increased nearly one-third within twelve months, and the end is not yet. There appears to be little difficulty now in getting capital interested where it can be demonstrated that there are good properties which will pay."

"There was a time when no inducements which could be offered would persuade capitalists to invest here, but that time is past, and inquiries are being made for good properties. The sales which have been made recently show that confidence has, in a measure, been restored, and unless that confidence is abused, there will henceforth be little difficulty in selling properties which are really good. The interests of the county demand that an end shall be put to mining schemes, the sole object of which is to beat Eastern capitalists and discourage them from further investments in New Mexico. Our mineral resources are practically without limit, and it is to the mine that we must look for the principal source of prosperity for Grant county. It is to our interest not to kill the goose which lays the golden egg, which is daily increasing in value. The outlook is very flattering now, and the increased activity in mining circles is sure to make itself felt in a financial way throughout the county before the summer months are here."

## OREGON.

A very complete review of mining operations in Oregon was written by Mr. Herbert Lang for the *Oregonian*. No new districts have been discovered, but development work has been very vigorously carried on. Portland people are taking some interest in mining, and smelting works have been established there. Capitalists of that city have been investing in mines of their own State and those of Idaho and Washington. The quartz and placer interests of Southern Oregon have not shown very encouraging results. Extensive veins of low-grade free-milling quartz exist, and there is a great area of country unprospected, but reduction facilities are wanting. There are only two quartz-mills in Jackson county. The Galia creek placers in Josephine county keep about 50 men at work. There have been no enlargements of the mining industries of Douglas county. Developments to considerable extent have been made on a ledge on the headwaters of Sucker creek, an affluent of the south fork of the Coquille river, at the southeastern extremity of Coos county, where the common angle of Josephine and Douglas counties ensues. The claim is being prospected, it is said, with encouraging results. On Sixes river, in Curry county, a promising placer claim has made a very fair output, it is said. The black sand mines along the coast have kept up their yield in several cases, but the interest of their working chiefly centers about the new processes for working the sands, a number of new inventions having been tried this year. Their success was not great in most cases, nor is it likely to be so long as inventors persist in clinging to the old and impracticable principle of forcing the sand through quicksilver."

The region on the western slope of the Cascades is being prospected more vigorously than ever before. There are mines in the Santean district but no mills. There are 50 men in the Blue River district. The experience of quartz miners during 1887 in Grant, Union and Baker counties has been, on the whole, very favorable, perhaps more favorable than ever before. There have been two or more pronounced failures—failures, too, where the mines were wholly in fault; but, on the other hand, there have been several successes, to more than balance the account. There has been improvement as much in the modes of working as in the value of the quartz found, and, to all appearance, there has been a general letting-down to business. Especially is this true of Pine creek."

Operations at the Bonanza mine, 35 miles west of Baker City, gave, last winter, a hope of great results, which have not been achieved. In this case the investor had the benefit of the wise professional skill of Prof. Clayton and Mr. Gilchrist, gentlemen of experience and probability. The 10 stamp mill which was erected to work the ore is described as of most excellent construction and design. The permanent workings of the Bonanza, a leased claim, are said to be also miracles of engineering skill, reflecting credit upon the designer. The expense of mill, underground work, tramways, etc., footed up \$30,000, the result being the most complete equipment possessed at that time by any mine in Oregon. The crushing began with *celat* and continued for some days, when, the pay rock being exhausted, the mill shut down."

The Eureka-Excelsior at Cracker creek will probably have a 40-stamp mill this year. Of developments at Rock creek, Silver creek and other newly-discovered regions of the Blue mountains the most encouraging reports are received. The work done thus far in both these localities has been very satisfactory and it is very likely more extensive operations may be in store for next year. The Chloride mine has begun shipping ore. The Tabor & Tracy mine in Granite district is reported to be "in bonanza" and the mill has been enlarged from five stamps to ten. The Bradley mine at Sanger, Union county, has been crushing from 14 to 20 tons per day, with much more rock in sight. There is a ten-stamp pan-mill and the rock is said to average \$45 per ton. The property belongs to the C. F. Bradley Mining Company, who have spent \$100,000 in the claim, etc. A mill is proposed also for the Golden Monarch mine in Granite district. The Worley mine in the same neighborhood, owned by Wolfe and others of Baker City, is said to have been sold lately. It contains some exceedingly rich ore, some of which has been crushed at the Bonanza mill."

Among the most important mining operations now proceeding in Oregon are in connection with certain of the Pioce creek mine, owned or controlled by the Oregon Gold Mining Company of Louisville, Kentucky. The affairs of this organization are administered by Prof. Luce, under whose direction the Whitman mine and several other claims near Cornucopia have been opened. The company's expenditures for two years past on these properties are said to aggregate \$200,000, including the cost of the very complete and perfect 20-stamp mill which began operations over a month since. More or less work is being done on several claims at Pine creek. Prominent among them are the Norway, Red Jacket, Union, May Flower, Last Chance, Way Up, Whitman, Forest Queen, Stella, Queen of the West, Red Boy, Mountain Chief, Companion, May Queen, Contact, Pine Creek, Star of Evening, Conundrum, Robert Emmet."

Notable discoveries have been made in Walla walla county, which promise well. The district is easily accessible. The silver ore from some

of the mines gives very good assays. The width of the mineral belt at Wallowa is as yet undetermined, but it is estimated at six miles. A very full description of the region, written by Mr. Leigh Harnett, has appeared in the *Oregonian* of recent date. It is said that tin and zinc exist near at hand. Another remarkable discovery in the region is the marble, of which several varieties have been shown to the writer. The different varieties are found in Hurricane gulch, one mile and a half from Joseph. The marble is evidently of excellent quality. Some reference to this region was made in the *PRESS* last week."

## UTAH.

The Utah mineral product remains about the same as in the year 1886. While it produced in 1887 48,456,260 pounds of refined lead against 45,678,961 pounds the year before, it only sent away 208,800 pounds of refined lead in 1887 against 2,500,000 pounds in 1886. There appear to have been no very remarkable developments in the Territory during the past year. Utah has some very high mines that yield largely, but it does not appear to have very many small ones that are producing. This would, in a measure, indicate that where capital has been invested in properly developing good mines they have been made very profitable. Utah is such a heavy producer of lead that there is some nervousness there now as to the possible action of Congress with relation to the tariff on that metal. The Territory is also a large producer of coal, iron, salt, and sulphur, and some other mineral substances."

The Salt Lake *Tribune* presented an excellent review of mining operations in that Territory, from which we condense the following information: In speaking of the smelting operations the *Tribune* says that the six or seven furnaces in blast the past year smelted 65,500 tons of silver ores and 34,000 tons of fluxing material, using 27,000 tons of fuel, and running out 13,000 tons of lead hillion, worth in Salt Lake—lead, an average for the year of \$50 a ton, silver 94 cents an ounce—\$178 per ton, or \$2,300,000."

The items of cost were as follows:

Article.	Tons.	Per Ton.	Total.
Iron ore.....	9,513	\$ 4.50	\$ 42,809
Limestone.....	24,920	1.75	43,608
Scrap iron.....	60	6.00	360
Colorado coke.....	15,728	13.00	204,464
Charcoal.....	1,680	13.00	21,840
Coal.....	7,503	6.00	37,516
Coal slack.....	1,374	3.00	4,122
Wood (corded).....	800	4.00	3,200
Labor, 270 hands, \$65 per month.....			212,621
Total.....			\$570,739

About \$8.70 per ton of ore smelted. The operations for the past year at the great Ontario mine have been confined to mining and milling. No new works have been undertaken and no new levels opened. The mine produced 37,176 tons of ore in 1887. The mill reduced approximately 27,930 wet tons, 23,834 dry tons, obtaining 1,093,938 ounces fine silver, which sold for \$1,045,205. Besides this, 10,834 wet tons, 9747 dry tons, were sold to the smelters for \$783,665. This ore contained 966,613 ounces fine silver. The company realized 141 per cent less for this ore than as though it had been reduced in the company's mill, against which of course must be set off cost of transportation to smelters, smelting and loss in smelting. The company obtained from ores reduced and for ores sold a total of \$1,823,870, of which it disbursed \$900,000 in dividends 123 to 139 inclusive. The year's work brings the total output of the Ontario to about \$19,300,000; total of dividends to \$8,825,000. The plant of mine and mill has cost \$2,570,000. The payrolls of the company carry from year to year an average of 400 men, at an average wage of \$100 each per month. There are still five or six years' work, Superintendent Chambers thinks, above the tenth level. The property never was in better condition than now."

The Daly ground, 1500 feet in length, joins the Ontario on the west. It is higher, so that the sixth level of the Ontario becomes the eighth of the Daly; several of the levels of the two mines have been connected. The Daly shaft is 3200 feet west of the Ontario No. 3, and rests at the eighth level, above which there is still two years' work. The sixth level drain tunnel of the Ontario takes the water of the Daly to the eighth level. Some of the Daly levels have been opened to the west end of the ground. The mine has a good hoist and the men are well housed. Its output the past year was about 25,418 wet tons; 22,178 of which were reduced at the company's mill (Marsac), yielding about \$710,035, 3240 tons were sold for \$262,853; making a total product of \$972,918, out of which \$300,000 was paid in dividends Nos. two to nine inclusive. The mill is at Park City. It has 30 stamps, with proportionate pans and settlers, Stetefeldt furnaces, revolving drives, retorts and furnaces, water rights, hydrants in case of fire, shops and necessary buildings, electric light, woodyard—all together a model mill."

A number of groups in the vicinity of these properties are being got in shape, titles settled, etc., in the belief that the ridge clear through to Big Cottonwood is good ground and contains parallel veins. Perhaps there is no place in Utah which offers greater inducement to the miner with money at command than the great ridge between Sawmill gulch and the Big Cottonwood."

On the Massachusetts, operations are very carefully conducted and occasional good hunches of ore are found. In the official reports of this company for the



past year, it is stated to have sold 1856 tons of first-class ore, and 3950 tons of concentrates, for \$150,922. Against this ore is charged a total expense of \$114,865, about \$19 a ton, \$5 of which is on account of concentration, leaving a profit of \$6.21 per ton. In 1884 the profit was \$6.52 per ton. The 3950 tons of concentrates represent upward of 20,000 tons of crude ore. The concentrating mill, in Park City, is connected with the mine by tramway, which rises 2000 feet in five miles. The property comprises 90 acres, the ore occurring in a zone, sloping with the hill, and about 100 feet below the surface. Probably 80,000 tons of ore have been extracted and sold, realizing to miner and smelter \$1,200,000, \$15 per ton; \$210,000 have been paid in dividends. Many thousands of tons of concentrating ore yet remain in the mine and on various ore dumps.

The mines of Salt Lake county are at Bingham canyon and on the Cottonwoods. About a thousand tons of ore came out of Little Cottonwood the past year, contributed by 15 or 20 mines, the leading shippers being the City Rock, the Josh Lawrence, the Albion and the Golconda. Prospecting for new ore bodies to the depths of the New Emma, the Flagstaff and the Eclipse has been kept up during the year, as it has for several previous years. These are all on the Emma belt or zone, the Eclipse being on the Big Cottonwood side of the divide. A good deal of deadwork has been done on other mines above and below the Emma belt, the practical results of which will appear in coming years. On the Big Cottonwood the Maxwell completed a long working tunnel in September, striking the ledge at a great depth, and much facilitating operations in the mine, draining it and enabling the ore to be taken out of the bottom instead of the top of the hill. The ore of the Maxwell is a very good article, selling for \$50 to \$70 a ton. About 500 tons were sent down the last quarter of the year.

#### Bingham Canyon.

Shipments of ores from Bingham the past year were approximately as follows:

Mine.	Tons.
Brooklyn	6900
Lead	3500
Jordan	3000
Old Telegraph	2600
Dixon	2400
Wienamuck	2200
So. Galena	1700
Spanish	1300
Yosemite	1300
Total	24,000

And about 7000 tons additional in the aggregate by the Rip Van Winkle, Lucky Boy, Silver Shield, Yosemite No. 2, Nast, Tiewaukie, Utah, York, Sacred, Last Chance, Bonanza, Aladdin, Badger, Alameda, Wasatch, Neptune & Kempton, and a few others, making in all about 13,000 tons; for the county, about 32,500 tons.

On the whole, the outlook for the district is much better than a year ago, with the exception, and it is a very serious one, that Bingham ores got a very black eye from the smelters the past year. But for that, with the high price of lead, the prospects of the district would be exceedingly bright.

At Tintio, the Eureka Hill shipped 11,000 tons of ore in 1887, about the average of its yearly shipments the last four years. The ore carries 5 to 15 per cent of lead, \$1.60 in gold, and enough silver to bring the value of the contents, exclusive of loss in treatment, to \$75 a ton. Deduct from this \$2.50 for hoisting and sampling, and \$23.50 for cost of transportation—it all goes East to be smelted—and one arrives at the Salt Lake value of the ore. Now, deduct cost of mining, inclusive of interest and wear and tear on mine plant and deadwork, and the net profit to the owner of the mine is obtained. In this case it can scarcely be less than \$30 to \$35 per ton. The litigation with the Beck and Bullion restricts the freedom of both deadwork and ore extraction. Shipments were suspended near two months in the summer while additions were made to the mine hoist.

The Beck and Bullion mine is also restricted in its operations by the litigation pending between it and the Eureka Hill. Yet its output for 1887 was near 6000 tons of 70-ounce ore. The ore, about 400 tons a month, is coming from the second and fourth levels. From the fourth level a winze has been sunk 40 feet in a body of ore, 15 feet wide at the widest and 45 feet long at the longest. The bottom of the winze is still in good ore. The ore at present carries 10 per cent lead, \$4 to \$5 in gold, and 70 ounces in silver.

Judged by their output, the other well known mines of Tintio have been worked but feebly the past year. A score of them have shipped a little ore, but less than 50 tons each on the average. Probably this was mainly by lessors who were contented with a sufficient output to give them a living. A few tons came from West Tintio, and a new district, four or five miles east of the Salt Lake & Western R. R., and six miles north of Eureka Hill, has contributed somewhat to the output of Juab county. Some of the ores are very rich in lead and poor in silver, while others run with the ordinary ores of Tintio. The importance of this new field it is yet too soon to determine.

Shipments of ores from Tintio for the year were approximately as follows:

	Tons of ore.	Approx. value.
Eureka Hill	11,000	\$825,000
Beck & Bullion	5,600	390,000
Mammoth	3,500	210,000
Northern Spy	1,000	60,000
Other mines	1,800	125,000
Totals	23,000	\$1,610,000

The value stated is that of the contents of

the ores, where they find their ultimate market in the East. The Salt Lake value would be less by at least \$25 per ton of ore. The Tintio Iron Co. shipped about 11,000 tons of iron ore, worth at the smelters about \$50,000.

The outlook for the district is better than at any previous time. The area of mining is enlarging, the success of the leading mines is stimulating prospecting and development, while the prices of the metals produced, with the exception of silver, rule higher than for a long time, and the rise does not appear to be largely speculative, but underlain by sufficient cause—either reduced production, increased consumption or both. It looks as though the raid on silver had about exhausted itself, too. The producing mines of Tintio district are as follows: Eureka Hill, Bullion-Beck, Mammoth, Gemini Con., Tintio Iron, Tintio, American Eagle, Mountain Chief, Silver Coin, Tesora, Centennial Eureka, Eureka No. 5, Stubbs, Sunbeam, Showers Con., King James, De Prizen Eureka, Wind Ridge, Park, West Tintio, Susan, Kappes, Red Bird (S. Ex. Showers), Etella, Sunbeam, Treasure, Sunbeam No. 2.

During the past year the Christy mill at Silver Reef worked 14,000 tons of ore, producing 235,771 gross ounces silver. This makes their sandstone ore average about \$16 per ton. The company own 26 mines, but only operate two, the Stormy King and California, which furnish all the ore necessary to keep the mill running. The mill has only five stamps, which reduce 40 tons of the easily-worked sandstone per day. The best ore bodies of the Stormy King are on the 600-foot level, but there are good stopes on the 4, 5 and 6 levels. The California mine is 800 feet deep and has a large body of good ore on that level. These mines show permanency, and are now, as in the past several years, regular producers. The property belongs to a close corporation of San Francisco men, and has for its local management R. T. Gillespie, who has been with the company a long time.

The Stormy mill was closed most of the year, but lately started to run through custom ores. It can treat ore cheaper than the Christy because using water-power while the latter uses steam. It reduces ores taken out by "choloriders" at such low prices as to have started a revival of business among this class of lessors. The mill is operated by the water of Virgin river. The mill reduces 20 tons of ore per day. Besides the two mills, there are leaching works which run part of the season and turned out 38,785 ounces fine silver. The figures given as the output of Christy bullion was gross ounces. Putting this down to fine ounces, the total output of the camp for 1887 was 152,341 12-100 ounce fine silver. The year closed with the prospects some brighter than the opening, as far as the mining industry goes.

#### WASHINGTON TERRITORY.

Washington Territory has never been greatly noted for its mines of precious metals, and the production has only been about \$100,000 to \$200,000 per annum. But of late some fine discoveries have been made in the Salmon river region, and mines are being opened in several places. Capital has become interested and developments will be more systematic. Two towns—Ruby and Salmon—have sprung up in the new mining region, and at least a quarter of a million of dollars cash has been paid for mining property in the districts. The winters there are short and by the end of February the "boom" is expected. The Arlington, the most prominent mine, has a lode some eight feet wide. Assays from some of the mines are quite high. Among the prominent mines are the Keystone, Fourth-of-July, First Thought, Ruby, Lemore, Anconda, Fairview, Lenore, War Eagle, and Missing Link. Some of these are under bond now. The country is being rapidly settled up. These mines are really on the Concomally, a tributary of the O'Kanagan river, though they are known as the Salmon river mines. The ores carry silver exclusively.

Troopers who arrived in Ellensburg from Lake Chelan inform the Capital that prospectors have been prospecting the mountains along the shores of that lake all summer and fall and have met with success, so much, in fact, as to induce them to put in the winter developing their prospects. The ore is similar in character to the Salmon river ores, and the veins are quite extensive, carrying gold, silver and lead. The troopers describe the lake as being over 60 miles in length, and in width from one to four miles, surrounded by rugged mountains, while the depth is from 100 to 1000 feet, and abounds with fine, large silver trout, from one to two feet in length. There is plenty of game, consisting of bear, deer, elk, moose and wild goats. The elevation of the lake above sea level is 500 feet and the climate is mild, with but slight snowfall. Ranchers have taken up ranches at the lower end of the lake and are making a comfortable living. The trappers describe the country as simply grand.

During the Mechanics' Fair at Portland last year a lot of minerals from Kittitas county, W. T., were exhibited. Included in the lot was a sample of coal taken from a car laden at the Roelyn coal mines of the Northern Pacific Coal Company, three and three-fourths miles from the main line of the Northern Pacific at Cle-elum junction. The coal field is four by thirteen miles in general extent, and is thus far known to be underlain with three distinct veins. It is an excellent steam and gas article, will make second-class coke, and is a fair black-smithing coal. The output is 400 tons daily,

and rapidly as possible the production is being increased. Outside of the limits stated a very large area of coal-bearing formation is as yet unexplored.

The specimens of iron ore sent were samples of the outcrop of the Uncle Sam and Iron Heart mines in the Iron Mountain District. The mines are three miles south of Cle-elum Junction, main line of the N. P. R. R., Kittitas county, W. T. The Uncle Sam shows 11 feet of ore at the discovery, and 800 feet therefrom the Iron Heart shows six feet and six inches of ore. Some 15 mines are grouped in the immediate vicinity, and a practically unlimited supply of brown hematite and magnetite iron ore will be drawn from this group of mines from this time forward. The Moss Bay Iron and Steel Company of North Cumberland, England, has determined to locate a Bessemer steel manufacturing plant, employing 2000 men at or near the Cle-elum Junction, and its representatives are engaged in buying the surrounding mines. American steel and iron workers are expected also to enter this new and extensive field.

The copper-silver ore was from the Bullion mine in the Cle-elum district, situated north and west of the coal-field, some 20 miles from the Cle-elum Junction. An immense mineral lode traverses the entire district showing one of this character. Extensive iron and lime deposits are found between the coal and copper belts, and a railroad to develop the latter has already been decided upon by the Northern Pacific. Surface indications show the copper-silver deposit to be equally extensive with the coal and iron.

The gold and silver samples represented in a general way the output of Cle-elum and Peshastin districts mill-ores. Assays run from \$25 to \$400 gold and silver per ton. Much of the Peshastin rock has been worked by free-milling process, and has yielded \$10 to \$100 in free gold, with concentrates sampling \$80 to \$250 per ton. With development and equipment of the adjacent iron and lime deposits of the Cle-elum district, ample facilities will be afforded for the proper working of these ores.

A smelter has been erected in the silver lead district of Colville to work custom ores. The capacity is 25 tons per day. More or less mining is being done at Chewelah. There are several other scattered districts in the Territory. The claims about Caledonia and Metaline, where the silver ore is low grade, have not been actively worked. Embrey, Peshastin, Swan and others are placer districts. The whole Territory is in need of reduction works, but it is confidently expected that this year its production of precious metals will be much larger than ever before.

The coal and iron mines of the Territory are important. Neither of these substances is very abundant on this coast, and the owners of these mines, when they properly develop them, are sure of a good reward.

#### Minersville, Utah.

EDITORS PRESS:—Mining in Beaver county, Utah, has been the past six months comparatively at a standstill. Tribute miners of North and South Star and also from the once famous Cave mine, keep sending occasionally carloads of ore to Salt Lake smelters, the Martin Bros. and the Horn Silver Co. of Frisco also adding their share. Though we have two smelters and two mills in the county, none are receiving. The Monte Cristo mill of seven stamps, owned by J. H. Dupaux, is starting up next month. Mr. Dupaux will also work his own and custom ores. It is a water-power mill situated 1½ miles east of Minersville, on Beaver river, and has a good future before it. There are four mining claims connected with the mill, yielding ores worth from \$15 to \$50. Three of them lie in a group and are patented. They are developed by tunnels and inclines. One of them is one mile distant from the mill. The claims are all owned by the same party.

Lincoln mining district, some 3½ miles from the Monte Cristo mill, has of late made considerable progress in opening up veins of galena ores, and will eventually come again to the front. Many patented claims are held by Eastern stock companies. Northeast of this is the Granite district, having galena ore and bluish veins, at present held by the owners, awaiting railroad facilities and nearer reduction works.

J. H. DUPAUX.

Minersville, Utah, Jan. 23d.

#### Mining Share Market.

There is little activity in mining stocks, but there is great activity in mining along the Comstock lode from the Utah to the Alta, and more ore is now being extracted and shipped for reduction than has been done on the Comstock in 15 years.

The Enterprise says: The demand for greater milling facilities is imperative, and will surely be met in the near future. Savage and Hale and Norcross are suffering materially on account of the lack of milling facilities. Justice is crying for a mill. The Yellow Jacket people need more and better milling power, and they will get it.

Following is the milling power of the Comstock: Mexican, 44 stamps; Brunswick, 76; Vivian, 16; Santiago, 25 only are fit to use; Morgan, 40; Eureka, 60; Rock Point, 20; Gold Canyon mills, 30; Six-mile Canyon mills, 30; Alta, 10; Nevada mill, 40; Battery mill, 80; total, 503 stamps. If stamps average three tons each daily by the month they are doing well, counting hanging up for repairs, etc. This gives us then a crushing capacity of 1,449 tons of ore daily when they are all in full blast.

#### Utah's Metal Product for 1887.

Wells, Fargo & Co.'s Statement of the Mineral Product of Utah for 1887.

	Lbs. of Copper.	Lbs. of Lead.	Lbs. of Silver.	Oz. of Silver in Bars.	Oz. of Silver in Bullion and Ores.	Oz. of Gold in Bullion and Ores.
Germania Lead Works	302,300	2,500,000	7,215,616	110,815	420,067	2,571
Hannan Smelter			12,004,000		543,437	2,050
Mingo Furnace Co.			5,215,310		278,265	993
Daly Mining Co.			1,503,600	713,337	292,422	451
Ontario Silver Mining Co.			4,029,200	1,055,463	915,200	927
Silver Reef District					221,723	
Other Mines and Places				11,116		107
Net Product Bars and Base Bullion	302,300	2,500,000	30,089,726	2,112,404	2,747,301	7,039
Contents Ore Shipped			13,941,950		1,091,596	3,070
Contents O.e and Matte Shipped	2,198,520		1,647,255		210,236	596
Totals	2,491,320	2,500,000	45,078,961	2,112,461	4,049,273	10,714

#### RECAPITULATION.

2,491,320 lbs. Copper, at 5 cents per lb.	\$124,566.00
2,500,000 lbs. Refined Lead, at 4 1/2 cents per lb.	111,750.00
45,078,961 lbs. Unrefined Lead, at \$2.40 per ton	1,106,788.77
6,101,737 ozs. Fine Silver at \$0.07 per oz.	5,076,844.89
11,373 ozs. Fine Gold at \$20 per oz.	227,440.00
Total Export Value	\$7,637,729.86

Computing the Gold and Silver at their mint valuation and other metals at their value at the seaboard, it would increase the value of the product to \$10,604,631.

Comparative Statement, showing the quantity of the Silver and Gold contained in base bullion produced in Utah:

YEAR.	Total Ounces of Silver Produced.	Total Ounces of Gold Produced.	Ounces of Silver in Ores and Base Bullion.	Ounces of Gold in Ores and Base Bullion.	Per Cent of Total Silver Product.	Per Cent of Total Gold Product.
1878	4,357,323	15,040	2,108,339	10,105	48.3-10	67.5-10
1879	3,835,047	15,932	1,797,589	5,093	46.8-10	35.7-10
1880	3,783,506	9,020	1,403,819	2,378	37.1-10	35.8-10
1881	5,400,111	7,958	2,643,899	2,622	48.9-10	32.9-10
1882	5,435,444	9,039	2,581,780	5,016	47.3-10	55.6-10
1883	4,531,703	6,991	2,351,190	5,397	51.8-10	80.
1884	6,069,488	6,539	3,253,084	3,806	57.4-10	68.8-10
1885	6,072,630	5,003	3,189,576	7,259	53.4-10	81.8-10
1886	6,018,942	10,577	2,538,203	8,389	47.0-10	79.1-10
1887	6,101,737	11,357	4,049,273	10,714	65.7-10	94

Comparative Statement of the value of lead bullion, including silver and gold necessarily produced in its manufacture west of the Missouri River, compiled from the annual reports issued by John J. Valentine, Vice-President and General Manager, Wells, Fargo & Co., San Francisco.

YEAR.	Total Value of Precious Metals, including Lead.	Total Value of Lead Bullion, including Gold and Silver Contents.	Per Cent of Entire Product.
1870	\$75,340,501	\$19,234,394	25.5-10
1880	80,167,936	28,114,564	35.
1881	84,504,417	30,253,430	35.8-10
1882	92,411,335	39,708,750	38.7-10
1883	90,313,612	34,810,022	38.6-10
1884	84,976,054	31,101,250	36.7-10
1885	90,181,203	35,731,711	39.6-10
1886	108,011,701	44,635,655	43.3-10

The above statement shows a marked annual increase in the percentage of precious metals produced in the manufacture of base bullion. It demonstrates conclusively that the process of smelting is in the ascendant for the reduction of ores, and that any causes tending to decrease or discourage the production of lead will produce a corresponding decrease in the gold and silver production west of the Missouri River.



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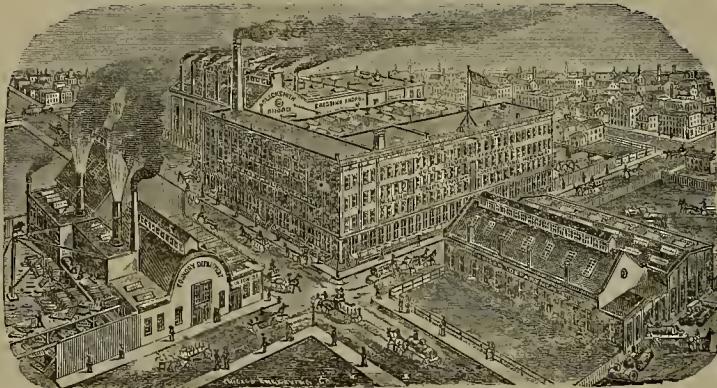
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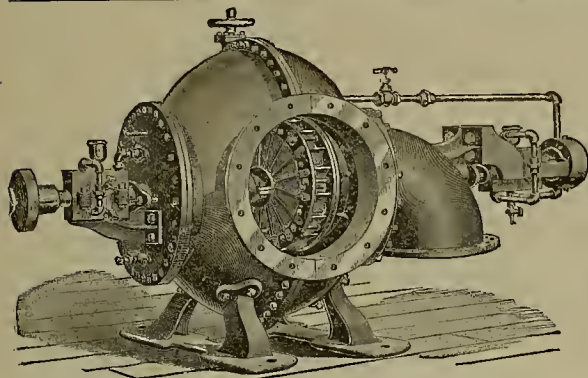
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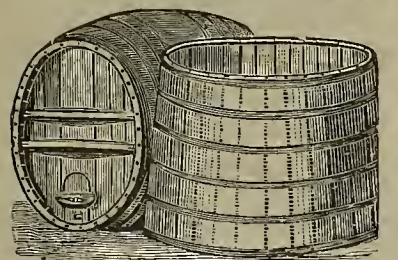
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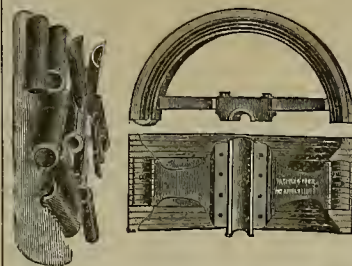
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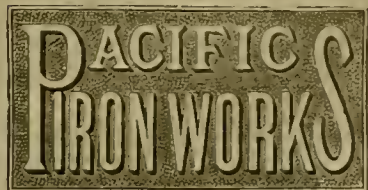
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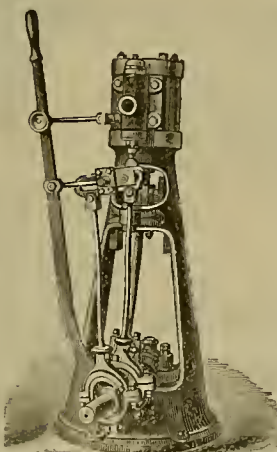
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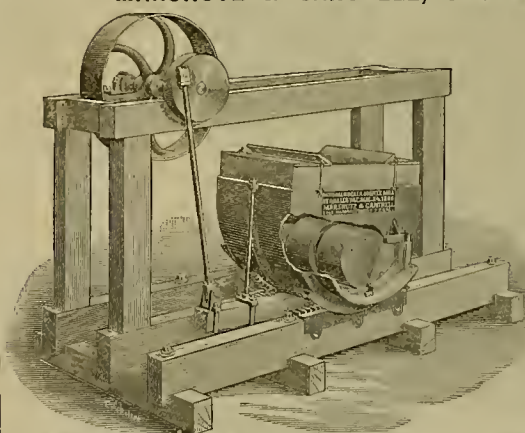
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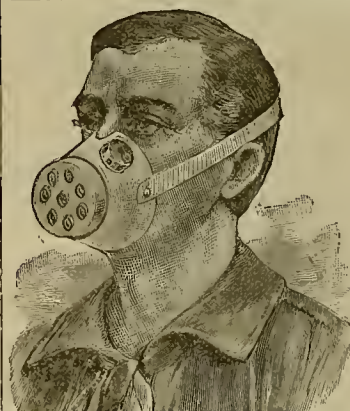
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Belle Isle M Co.	Nevada.	11.	15. Dec 14. Jan 17.	Feb 7. J. W. Pew.	310 Pine St
Best & Belcher M Co.	Nevada.	39.	50. Jan 4. Feb 9.	Mar 2. L. Osborn.	319 Montgomery St
Baker Divide M Co.	California.	15.	25. Jan 7. Feb 12.	Mar 3. J. Newlands.	323 Pine St
Groven Point G & S M Co.	Nevada.	48.	50. Jan 5. Feb 8.	Mar 21. C. E. Elliott.	329 Montgomery St
Chollar M Co.	Nevada.	21.	10. Dec 5. Jan 10.	Jan 31. C. E. Elliott.	329 Montgomery St
Commonwealth Con M Co.	Nevada.	6.	50. Dec 29. Feb 1.	Mar 28. H. Deas.	309 Montgomery St
Comet Con M Co.	California.	4.	3.00. Jan 6. Feb 17.	Mar 14. H. Lacy.	321 California St
Eva Con M Co.	Nevada.	1.	15. Jan 5. Feb 10.	Mar 5. J. Stadfield Jr.	309 Montgomery St
Flower M Co.	Nevada.	5.	20. Jan 13. Feb 17.	Mar 9. L. P. Holden.	113 Leidesdorff St
Found Treasure M Co.	Nevada.	2.	06. Jan 31. Mar 9.	Mar 28. J. Stadfield Jr.	419 California St
Gray Eagle M Co.	California.	5.	14. Jan 4. Feb 10.	Mar 3. T. W. Zel.	522 Montgomery St
Genesee M Co.	Nevada.	1.	06. Jan 10. Feb 14.	Mar 6. E. F. Stone.	306 Pine St
Heath M Co.	Idaho.	2.	15. Nov 4. Dec 10.	Dec 20. W. L. Oliver.	329 Montgomery St
Iowa M Co.	Nevada.	18.	25. Dec 21. Jan 24.	Feb 11. C. B. Higgins.	408 California St
Kossuth M Co.	Nevada.	9.	10. Nov 25. Jan 5.	Feb 6. C. K. Starkevant.	309 Montgomery St
Live Oak Drift M Co.	California.	7.	05. Dec 12. Jan 16.	Feb 4. T. Wetzel.	522 Montgomery St
Mayflower G M Co.	California.	40.	53. Jan 16. Feb 14.	Mar 16. J. Morio.	328 Montgomery St
McKean G & S M Co.	Nevada.	35.	25. Jan 17. Feb 17.	Mar 13. C. E. Elliott.	329 Montgomery St
Manhattan M Co.	Nevada.	7.	1.00. Dec 9. Jan 12.	Jan 31. J. Crockett.	327 Pine St
Mon. G M Co.	California.	25.	50. Dec 20. Jan 24.	Feb 28. G. W. Sessions.	349 Montgomery St
North Bonanza M Co.	Nevada.	3.	15. J n 19. Feb 15.	Mar 14. J. J. Scoville.	309 Montgomery St
Norjo M Co.	Nevada.	1.	15. Jan 10. Feb 14.	Mar 6. H. W. Pew.	310 Pine St
Nevada Queen M Co.	Nevada.	3.	50. Dec 16. Jan 24.	Feb 16. H. Deas.	309 Montgomery St
Occidental M Co.	Nevada.	1.	25. Dec 18. Jan 16.	Feb 8. A. K. Durbrow.	329 Montgomery St
Paradise Valley M Co.	Nevada.	4.	10. Jan 22. Mar 1.	Mar 23. W. L. Oliver.	328 Montgomery St
Quartz Mt G M Co.	California.	20.	30. Jan 17. Feb 20.	Mar 15. E. Hestres.	329 Montgomery St
Sierra Nevada M Co.	Nevada.	91.	25. Dec 7. Jan 10.	Mar 6. E. L. Pease.	309 Montgomery St
Spring Valley G M Co.	California.	2.	50. Jan 11. Feb 18.	Mar 18. H. Pichoir.	320 Sansome St

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE
Cibola Creek M & M Co.	Idaho.	L. Osborn.	309 Montgomery St.	Annual.	Feb 6
Holmes M Co.	Nevada.	C. E. Elliott.	309 Montgomery St.	Annual.	Feb 14
Lucky Hill Con M Co.	Nevada.	F. D. Back.	7 E 11 St.	Annual.	Feb 9
Teikoff Con M Co.	Nevada.	W. J. Gurnett.	238 Pine St.	Annual.	Feb 6
Watt B. de Gravel M Co.	California.	C. C. Cox.	8 Post St.	Annual.	Feb 2
William Penn M Co.	California.	J. J. Scoville.	309 Montgomery St.	Annual.	Feb 7

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A. W. Hutton.	309 Montgomery St.	25.	Jan 10
Eureka Con M Co.	Nevada.	H. R. P. Hutton.	310 Pine St.	50.	Feb 2
North Belle Isle M Co.	Nevada.	J. W. Pew.	310 Pine St.	50.	Feb 3
Russell Reduction & M Co.	California.	J. Morio.	328 Montgomery St.	45.	Sept 17
San Francisco Copper M Co.	California.	F. E. Berier.	320 Sansome St.	44.	Sept 19
Standard Con M Co.	California.	J. W. Pew.	310 Pine St.	65.	Jan 12

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Jan. 12.	WEEK ENDING Jan. 19.	WEEK ENDING Jan. 26.	WEEK ENDING Feb. 2.
Alpa.	1.35	1.65	1.45	2.40
Alta.	2.00	2.20	1.90	2.30
Andes.	1.25	1.3	1.15	1.25
Argenta.	6.00	6.75	5.50	7.00
Best & Belcher.	5.75	6.00	5.50	6.50
Bullion.	1.65	1.9	1.45	1.65
Baltimore.	1.00	.95	.85	.85
Belle Isle.	1.00	.95	.85	.85
Bodie Con.	2.70	2.30	2.70	2.45
Benton.	1.00	.95	.85	.85
Bodie Tunnel.	1.00	.95	.85	.85
Bulwer.	1.00	.95	.85	.85
Con. Va. & Cal.	1.00	.95	.85	.85
Challenge.	2.20	2.50	2.10	3.20
Champion.	1.00	.95	.85	.85
Chollar.	1.00	.95	.85	.85
Confidence.	1.00	.95	.85	.85
Con. Imperial.	1.00	.95	.85	.85
Caledonia.	1.00	.95	.85	.85
Con. Pacific.	1.00	.95	.85	.85
Crown Point.	7.50	7.5	7.5	7.5
Crocker.	1.00	.95	.85	.85
Central.	1.00	.95	.85	.85
Dudley.	1.00	.95	.85	.85
East B. & E.	1.00	.95	.85	.85
Eureka Con.	1.00	.95	.85	.85
Excelsior.	1.00	.95	.85	.85
Grand Prize.	1.00	.95	.85	.85
Gould & Curry.	1.00	.95	.85	.85
Hale & Norcross.	1.00	.95	.85	.85
Holmes.	1.00	.95	.85	.85
Independence.	1.00	.95	.85	.85
Iowa.	1.00	.95	.85	.85
Julia.	1.00	.95	.85	.85
Justice.	1.00	.95	.85	.85
Kenwick.	1.00	.95	.85	.85
Lady Wash.	1.00	.95	.85	.85
Martin White.	1.00	.95	.85	.85
Mono.	1.00	.95	.85	.85
Mexican.	1.00	.95	.85	.85
Mt. Diablo.	1.00	.95	.85	.85
Northern Belle.	1.00	.95	.85	.85
Nevado.	1.00	.95	.85	.85
North Belle Isle.	1.00	.95	.85	.85
Niagara.	1.00	.95	.85	.85
Nev. Queen.	1.00	.95	.85	.85
North U. & C.	1.00	.95	.85	.85
Occidental.	1.00	.95	.85	.85
Ophir.	1.00	.95	.85	.85
Overman.	1.00	.95	.85	.85
Postal.	1.00	.95	.85	.85
Peerless.	1.00	.95	.85	.85
Pe. r.	1.00	.95	.85	.85
P. Sheridan.	1.00	.95	.85	.85
Silver Star.	1.00	.95	.85	.85
Savage.	1.00	.95	.85	.85
Seg. Belcher.	1.00	.95	.85	.85
Sierra Nevada.	1.00	.95	.85	.85
Silver Hill.	1.00	.95	.85	.85
Silver King.	1.00	.95	.85	.85
Scorpion.	1.00	.95	.85	.85
Syndicate.	1.00	.95	.85	.85
Union Con.	1.00	.95	.85	.85
Uta.	1.00	.95	.85	.85
Yellow Jacket.	1.00	.95	.85	.85

## Sales at San Francisco Stock Exchange.

THURSDAY Feb. 2, 1888.	170 Hale & Nor.	100 Justice.	100 Lady Wash.	100 Mexican.	100 Nevada.	100 Ophir.	100 Overman.	100 Postal.	100 Peerless.	100 Pe. r.	100 P. Sheridan.	100 Silver Star.	100 Savage.	100 Seg. Belcher.	100 Sierra Nevada.	100 Silver Hill.	100 Silver King.	100 Scorpion.	100 Syndicate.	100 Union Con.	100 Uta.	100 Yellow Jacket.
250 Alpa.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
300 Andes.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
250 Alpha.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
450 B. & Belcher.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
300 Belcher.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
900 Bullion.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
450 Challenge.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1750 Chollar.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
335 Con Va. & Cal.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
250 Crown Point.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
40 Confidence.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
200 Crocker.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
425 Eureka Con.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
300 Excelsior.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
825 Gould & Curry.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1350 Grand Prize.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

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FOR WEEK ENDING JANUARY 17, 1888.

376,467.—PAWL AND RATCHET MECHANISM—R. J. Ballew, Magalia, Cal.  
 376,425.—SPRING VEHICLE—A. Bink, Stockton, Cal.  
 376,426.—INKING ATTACHMENT FOR PRINTING PRESSES—J. R. Brodie, S. F.  
 376,468.—FENCE-POST TIGHTENER—Levi Brooks, Black Diamond, W. T.  
 376,577.—CAN-OPENER—H. Bruckerman, Table Rock, Cal.  
 376,519.—PACKING CASE—Jos. Davy, Oakland, Cal.  
 376,437.—RUBBER DAM CLAMP—J. H. Haich, S. F.  
 376,651.—CHIMNEY—B. F. Hentz, S. F.  
 376,558.—METHOD OF FITTING GARMENTS—E. Stahl, Prescott, A. T.  
 376,565.—TAMPING TOOL—Waldron & Bolter, Folsom, Cal.  
 376,569.—TELEGRAPHIC APPARATUS—S. B. Whitehead, S. F.

FOR WEEK ENDING JANUARY 24, 1888.

376,735.—WEED-CUTTER—Denehy & Childs, Acamp, Cal.  
 376,739.—SAMPLE TRAY—D. Goldstein, S. F.  
 376,804.—CAN-CRIMPER AND CAPPER—M. Jensen, Astoria, Ogn.  
 376,755.—RAILWAY CROSSING—W. H. & R. T. Shannon, Stockton, Cal.  
 376,787.—FRICTION FIRE-ESCAPE—Smith & Olds, Helix, Ogn.

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## New York Metal Market.

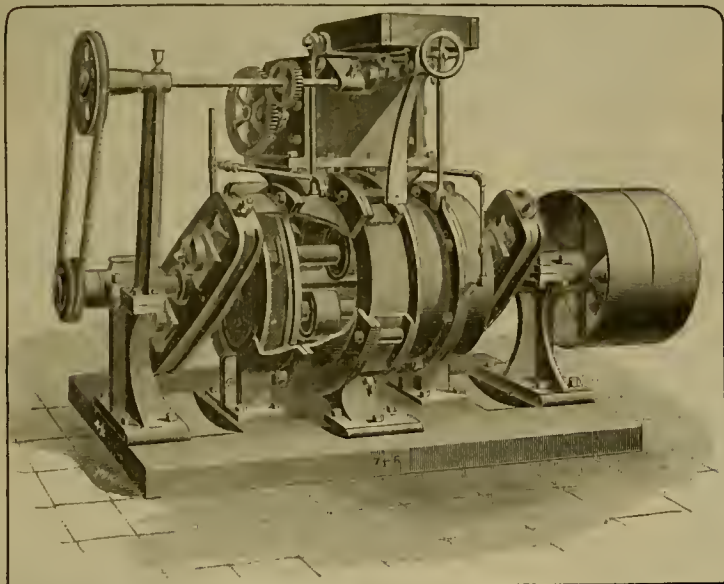
Telegraphic advices dated Feb. 2d give the following New York prices:

BAR SILVER—95¢ per oz.  
 BORAX—95¢ per lb.  
 COPPER—LAKES—\$16.40@16.60.  
 IRON—No. 1, \$22.00.  
 LEAD—\$4.90.  
 TIN—\$36.90.  
 The following is the latest by mail from the "New York Metal Exchange Market Report":  
 COPPER—Dull, spot closing at \$16.90@17.20. Transferable Notices (Lake) issued at \$16.90@—.  
 LEAD—Quiet at \$4.92@5.00 spot. Transferable Notices issued at \$5.00.  
 TIN—Weak at \$36.80@37.10. Transferable notices issued at \$34.00.  
 MARKERS' PRICES—At tidewater. 100-ton lots of listed irons (when brand is specified) range nominally about as follows: Lehigh, Grade No. 1, \$20.50@21.00; No. 2, \$19.60@20.00; Grey Forge, \$17.00@17.50; Hudson River, Grade No. 1, \$20.50@21.00; No. 2, \$19.60@20.00; Grey Forge, \$17.00@17.50; Southern, Grade No. 1, \$20.00@21.00; No. 2, \$19.50@—; Grey Forge, \$17.00@—.  
 Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery.  
 Australian Tin, \$37.00@37.50; Billiton Tin, \$37.00@37.50; Banca Tin, \$—@—; Baltimore Copper, \$14.60@15.40; Orford Copper, \$15.25@16.60; P. S. C. Copper, —@—; Foreign Lead, \$5.40@5.60; Foreign Spelter, \$6.10@6.30. Antimony



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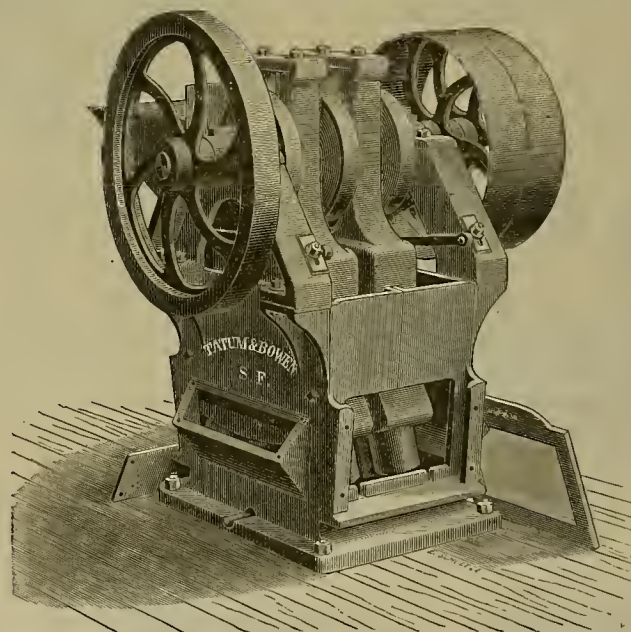
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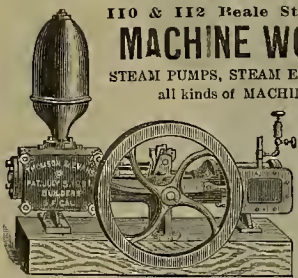
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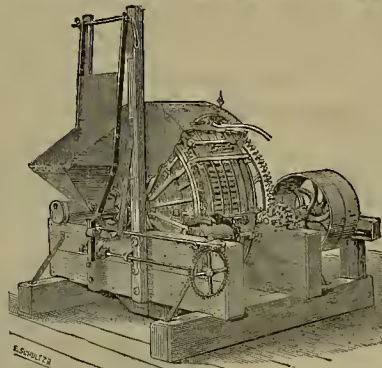
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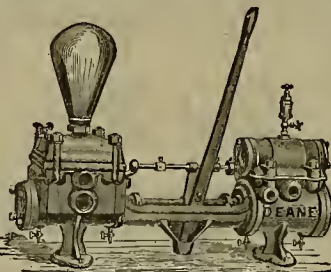
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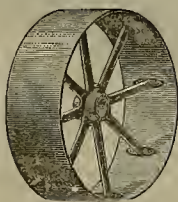
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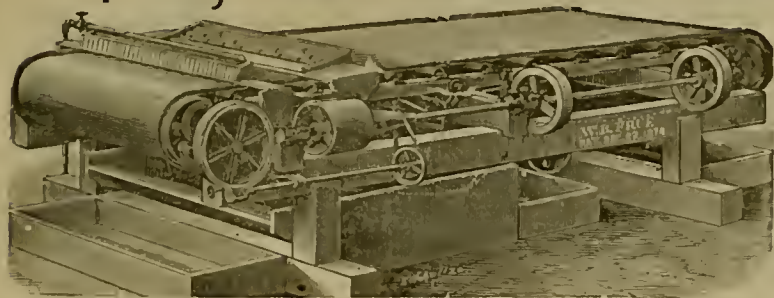
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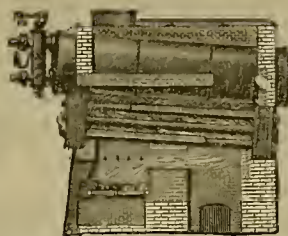
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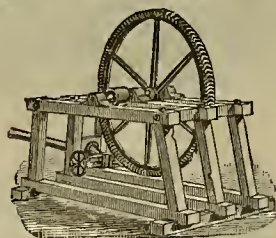
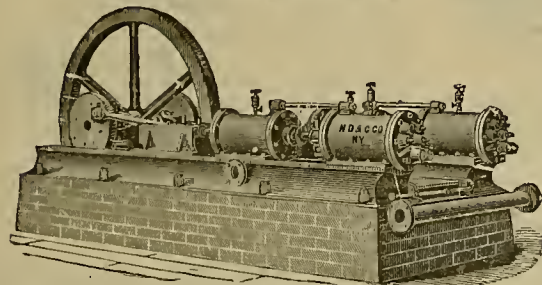
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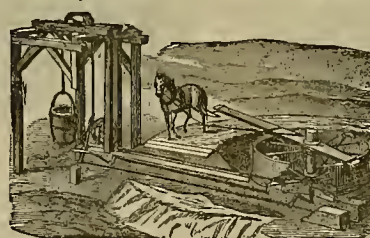


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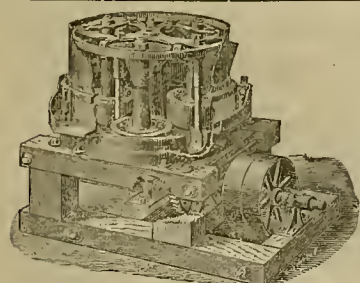
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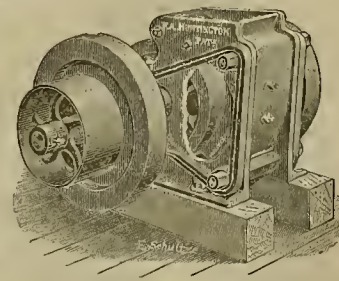
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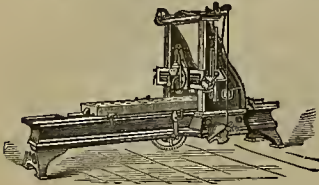
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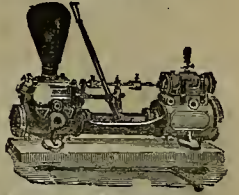
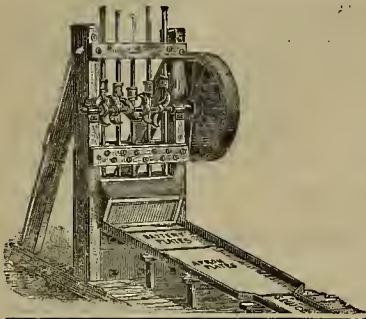
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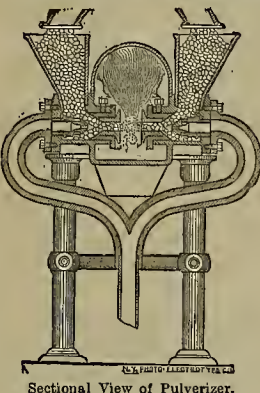
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BLOWERS AND EXHAUST FANS.

LEATHER and RUBBER

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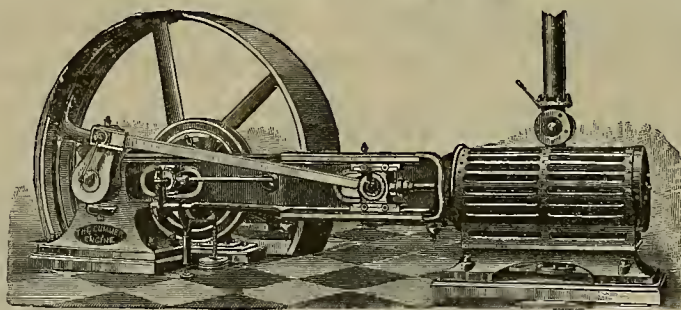
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PIPE and PIPE FITTINGS.

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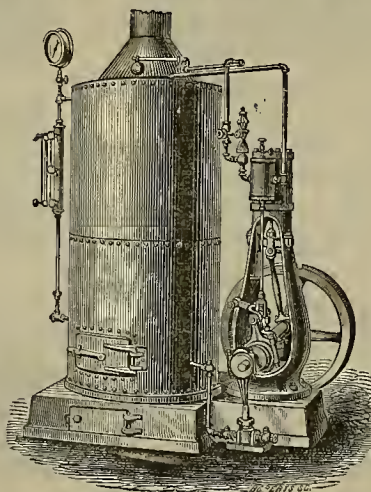
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Hydraulic Mining, Quartz, and Saw-Mill Machinery, Hydraulic Gravel Elevators, Hydraulic Giants, "Triumph" Ore Concentrators, Automatic Ore Feeders.



SPECIAL AUTOMATIC ENGINES.

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Upright Engines and Boilers Connected.

Stationary, Portable, and Hoisting

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Shafting,

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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, FEBRUARY 11, 1888.

VOLUME LV.  
Number 6.

## Workingmen's Homes.

In recent numbers of the PRESS we have illustrated several types of the homes of workingmen of different countries. In continuing this series we give engravings of the homes of the workingmen of Mr. Krupp, colony of the "Three Linden Trees," Essen, Rhenish Prussia. The houses he builds for workingmen are said by Mr. C. D. Wright, who wrote a special report on the subject for the Census Bureau, to be among the most substantial in Europe. The houses compare well with the men employed in the celebrated steel works. Herr Krupp, by his system of employment, has the selection of the best mechanics in Europe. This system comprehends all the advantages to be found in model industrial establishments, including excellent tenements and gardens at low rents. All the houses in the "colonies" just outside the town are owned by Herr Krupp; in fact, he believes that he receives better results by owning everything, and by being able thereby to control the sanitary surroundings of the dwellings of his people. These colonies, each having its name, are laid out with parks, schools, churches, supply-stores, etc.

The housing of single men at Essen is on the barrack plan, and is far below the American corporation boarding-house style of housing our single operatives. But the inspectors prevent the men from crowding themselves in tenements. They expel workingmen who live in too small tenements.

The houses for families are quite good. On this page are engravings of a couple of types of the class. The price of a group of four houses such as is shown is \$4185. The price for one house, including the land, is \$1046.25. The annual rent of two rooms, with a cellar, varies from \$20.93 to \$25.11 in a house with two stories. The rent of a house in this group is from \$37.20 to \$41.85 a year. The refuse matter is taken by the peasants of the surrounding country, who use it as compost. The roof is covered with tiles. The exterior walls are of rubble stone or ashlar; the interior partitions are of wood. The window-sills and stairways are of stone.

In 1876 Herr Krupp, to accommodate his workmen, constructed 3277 tenements, which are occupied by 16,700 persons. On account of the rapid development of his works he has been obliged to build houses with stories. They are obliged to give every family a separate entrance.

The engravings also show a group of two houses arranged for four families. In this group the annual rent of a tenement composed of four rooms is \$41.85. The employees of Herr Krupp pay their rent once in three months. The rent of the workingmen is regulated by reserves made from their pay, which is carried into effect every 15 days. The rent of widows is paid by the benefit societies.

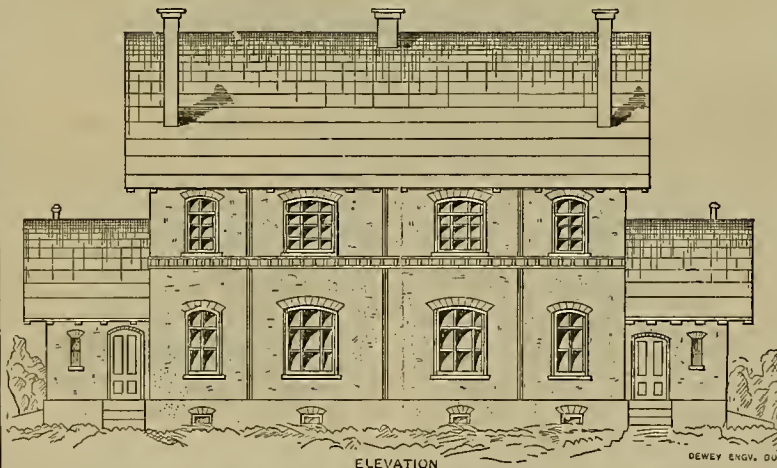
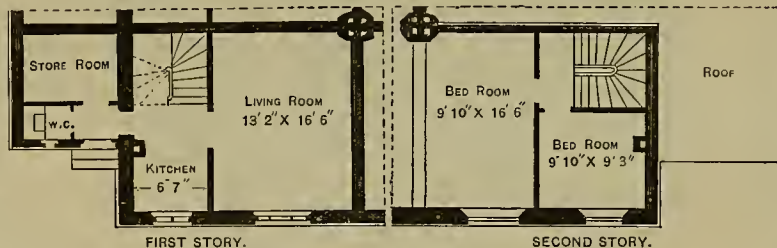
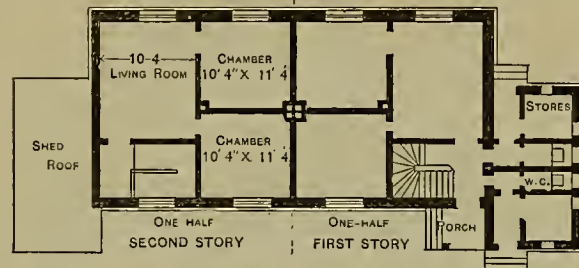
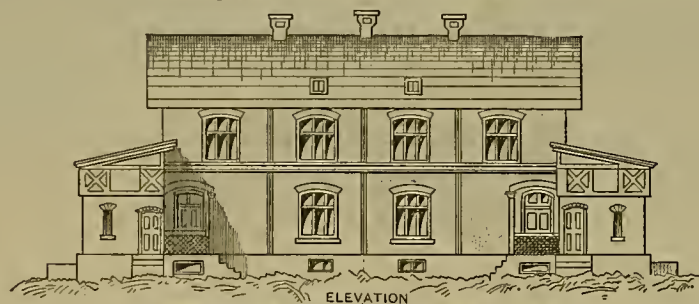
It is reported that quite extensive works will be constructed this spring on the shore of Owens lake, east from Olanche, for the evaporation of lake-water and gathering soda. The ground is said to be much better there for the purpose than anywhere else on the shore of the lake.

THERE are 272,448 children between 5 and 17 years of age in this State. The State appropriation for school moneys is \$6.65 for each head, an aggregate of \$1,811,779.

**DISCOVERY OF DIAMONDS IN A METEORIC STONE.**—Professors Latschnef and Jerodief report the examination of a meteoric stone weighing four pounds, which fell in the district of Krasnoslobodsk, Government of Pensa, Russia, on September 4, 1886. In the insoluble residue small corpuscles showing

Australia. If this supplementary discovery be confirmed, we may at last be placed on the track of the artificial production of the precious stone.

At the Moomoth mine, 56 miles north of Tucson, on the San Pedro river, Prof. Price has



WORKINGMEN'S HOMES AT KRUPP'S STEEL WORKS, ESSEN.

traces of polarization were observed; they are harder than corundum, and have the density and other characters of the diamond. The corpuscles are said to amount to one per cent of the meteoric stone. Carbon, in its amorphous graphitic form, has been long known as a constituent of meteoric irons and stones; lately, small but well-defined crystals of graphitic carbon having forms often presented by the diamond have been found in a meteoric iron from

been doing some experimental work for a wealthy Eastern syndicate. If the work comes out well a large plant will be erected and mining conducted on a large scale.

**BANNER DISTRICT,** San Diego county, is about five miles east of Julian and about 1500 feet lower. There are several extensive gold mines here, the principal one being the Ready Relief.

## Size of Mining Locations.

Senator Stewart of Nevada has introduced in the Senate a bill to amend the mining laws of the United States, by providing that no person shall acquire more than one mining claim on the same vein or relocate a claim which he has previously located; and also requiring that each patent for mining land shall reserve the right of way through or over any mining claim for roads, ditches, canals, cuts and tunnels, for the purpose of working other mines, provided the damages occasioned thereby shall be assessed and paid for according to law.

Some of the States have laws giving right of way over mining claim for ditches, etc., but these laws are not universal, as they would be in case Senator Stewart's bill became a law.

The provision that "no person shall acquire more than one mining claim on the same vein" is somewhat obscure, as the telegraph gives us the wording. It can scarcely mean that one person shall not purchase adjoining claims on the same lode, and probably means he may not locate and take up two claims. As the law now stands, a person can only locate a claim 1500 feet long by 600 feet wide, but there is really nothing to prevent him taking twice as much ground as this providing he takes up two claims. If he does not want to do this in his own name, he uses another name for the second claim.

As a general proposition, the size of claims allowed is larger than need be. It is very seldom that the whole length of any of these lode claims is worked. Yet as the law allows the size mentioned, every one takes up that much ground.

If Mr. Stewart's bill will have the effect of putting an end to the custom of taking up a whole lot of ground which others might work, it would be a good thing. The dog-in-the-manger policy is followed too much in the mining regions. There are some people who are natural "hogs" in this respect. They get a piece of ground and want to hold half a county at each end of it to keep others off. It is to be hoped that this custom can be stopped by law, but we very much doubt it. People can get others to do the legal locating and then purchase the locations. The timber land laws only allow a man a certain acreage, but any individual with a little money has no difficulty in getting all he wants in one tract. It is pretty much the same in the mines. A mere location with a "notice" and a couple of piles of rocks for boundary monuments is cheap enough for any one to buy, and it is easy enough to get men to make such locations. It may be that when we see the full text of Senator Stewart's bill he has so worded the paragraph referred to as to obviate the difficulties, and it is to be hoped he has.

**JULIAN DISTRICT.**—This place was founded nearly 20 years ago as a mining camp, and at one time was the most populous town in San Diego county. It is situated about 50 miles northeast of San Diego, about five miles from the proposed line of the S. P. R. R., and is to be the terminus of the San Diego & Cuyamaca railroad. It is on the divide that separates the Pacific Slope from the interior basin, and its altitude is 4000 feet.

THE old copper mines in the Mount Diablo region, Contra Costa county, may be again opened if the price of copper continues high.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—Eds.

## Notes of Honduras.

EDITORS PRESS:—Honduras is not Heaven; that is my private opinion. I will not argue the point with any one who has not, as I have, qualified himself by a muleback ride, during the rainy season, over several hundred miles of the country.

To say that there is a great deal of land to the acre in Honduras would expose me to the charge of violating the ordinance against chestnuts, so I refrain, but would beg to remark that the country richly merits its name, and he who will journey therein may prepare himself for even more ups and downs in life than fall to the lot of the ordinary itinerant.

The most prominent physical characteristic of Honduras is lumpiness; it is not ridged and furrowed like Nevada; if it could be flattened it would occupy a much larger space than it now does on the map of the world, and the intention with which the President is credited, of remaining neutral in case of a war in Europe, might acquire greater significance than it seems to possess at present.

Yet Honduras cannot be called a very rugged country, the softness of the rocks, chiefly of porphyritic or clayey nature, precluding this usual feature of mountainous regions to a great extent; moreover, the surface, from the bottoms of the ravines to the summits almost of the lofty volcanic cones, as well as on the steepest acclivities of the innumerable humps and humps, and in the few and diminutive valley bottoms, which would scarcely rank as valleys in California, is covered with a dense growth of trees, vines, and brush, or with a coat of emerald-green grass. It is to the

## Luxuriance of Vegetation

That I ascribe the conservation of a rich soil, on the multifariously "tipilted" face of the country, which would otherwise inevitably be washed away by the copious daily rainfall during from six to eight months of every year.

It would be an error to suppose that the steepness of the country in general must preclude the raising of crops everywhere. Clearings are made by the patient people on ground which stands at an angle of 45 or more degrees, and good crops are raised thereon; but not a plow nor a grubbing-hoe disturbs the matted roots of the natural vegetation, the sole security for the stability of the *milpa* on the slippery and water-soaked bedrock. Even on the more level lands a plantation of coffee, tobacco, indigo, or what not, is scarcely distinguishable from the surrounding wilderness, of which, in fact, it usually forms but a modified portion. Only at one place, called Colual, I saw an orchard in which the ground between the regular rows of fruit trees was kept clear, as with us in California.

Some of the finest tobacco in the world is grown in the department of Copan; also coffee of similar good quality, so that the native of very moderate means may enjoy a beverage the equal of which cannot be got in San Francisco, and puff a cigar which would grace the lips of an American millionaire. From a gastronomic point of view, however, Honduras is at best not a brilliant success. It is true that in Copan our party fared pretty well, considering, but there was a good deal to consider; and those of us who went to Curaren nearly starved. There is a great and discouraging abundance of *no hay*, and a correspondingly plentiful lack of many things which, in our country, are considered as necessities of life. Yet we found that *no hay* was often a mere subterfuge, to save trouble, and by persistently ignoring that, and demanding what we wanted, we often got what we wanted. This hint is worth the attention of those who may contemplate a visit to the country.

## One Excellent Feature

Of Honduras is the *Cahilda* found in every village. This is a substantial and reasonably capacious house of one room which, though utilized as a schoolroom and courthouse, is at the disposal of any traveler who may need its shelter, peddlers being even permitted to display their wares in the inevitable corridor or veranda. The *cahilda* is in charge of the *alcalde*, whose duty it is to see that the temporary occupant is provided by the villagers with all obtainable necessities on payment of a just price. Even between villages where the distance is much beyond a day's drive, good sheds are erected for the use of the pack trains. We experienced the benefit of this humane and liberal institution on many occasions, there being no hotels in the smaller villages or towns.

## The Facilities for Travel and Traffic

Are extremely poor. It may almost be said that there are absolutely no roads in the country; at least I saw none, and only heard of 18 miles of decent road, near the capital, the cost of which nearly bankrupted the National treasury; nor is this very surprising when it is considered that there are not so many people in all Honduras as there are in San Francisco, and there is an army, a president, a congress and a host of officials to be supported and paid, while the people in general are extremely poor. Trails there are in bewildering variety and pro-

fusion, so that a guide is a necessity in traveling, and even guides sometimes lose their way.

## The People of Honduras

Resemble the Mexicans in their general characteristics and style of living, building, etc., but seem to be more honest and amiable. Exorbitant charges are infrequent, and it is nothing unusual to intrust a common workman or servant with the carrying alone through the labyrinthine wilderness of this most intricate country, of hundreds of dollars in specie, which he is sure to deliver with punctilious exactitude to the proper person, from whom he exacts a written receipt. This man probably earns about 30 cents a day, and I have known such a messenger to deliver his charge faithfully where a deviation of two leagues would have put him over the frontier and in a different country.

In other respects the morals of the country are such as we, with our customary assumption of virtue which as a community we do not possess, should call "shocking," though, as a matter of fact, if our detectives are to be believed, the natural sins of Honduras are as nothing compared with the grotesquely horrible debauchery of the Queen City of the Pacific, to say nothing of the ordinary—very ordinary—immoralities which are or are not Chronicled, Examined, Called and Posted daily among us.

Many of the women of Honduras seem to be widows by courtesy—that is, unmarried, deserted mothers—who, to an inquiry for their husbands, will answer that they are dead, though many of them frankly confess that they were never married, and seem to attach no undue importance to the fact.

In outward deportment at least—and that counts for something—the women of all the Spanish-American peoples, so far as I have observed, are modest and reticent. I have never known one of them, even of the avowed *hetera* of a town, to accost a stranger or make immodest overtures. But it goes between the pathetic and the ludicrous to see how the mothers and other female relatives watch and guard the young girls, with the almost invariable result that the girls follow in the paths which their mothers have trodden, or perhaps those same mothers may sacrifice them for some object, pecuniary or otherwise, of their own, while the daughters themselves are frequently not unwilling victims. The girls of Honduras are remarkable for good physical development. The practice of carrying vessels of water on the head, which among the poor is a part of a girl's daily task, the absence of crippling shoes and deforming corsets, the simple food and freedom from exhausting toil, the grinding of corn by means of the *metate*, and the constant ascending or descending of hill or mountain, give to their bodies the natural grace which comes from strength combined with suppleness. As to legs and hips, they would be the envy and despair of Market street, without the adventitious aid of old newspapers or wire trapings (trape). They are magnificent breeders, too. It is no uncommon thing to see a matron, yet on the right side of 40, who is the mother of a couple of dozen, and grandmother to a lot more.

The little girls are generally pretty, as are also the boys; the former, on reaching womanhood, are still attractive, but in maturing they usually run either to hump or to blubber. Their faces bear, more or less, the stamp of ignorance and mental torpor; they have an unpleasant habit of spitting without apparent cause.

The men, in youth and early manhood, are generally good-looking, almost always pleasant-appearing. Taking the people all in all, I like them.

Many consider these people lazy. I do not; but they are philosophical in a certain way. They will work hard and do the best they know how, and are not slow to learn; but they will not sacrifice themselves to excessive toil for the sake of a trifling and temporary gain, nor to gratify the restlessness or greed of the stranger who usually damns them for not knowing what they never had occasion to learn and condemns them because their ways are not his ways, their cleanliness is not his cleanliness (they wash a chicken with soap and water and shave it with a *machete* for cooking). Nor are they dirty in the particular modes of dirtiness which he cherishes as his inalienable prerogative. (A cesspool is unknown out of a city.) In kindness and hospitality, according to their means, they are fully our equals; in universal courtesy and constant good humor, under all circumstances, they are greatly our superiors. I have yet to see a Honduran angry, or to hear him grumble at the heat, the wet or hardship of any kind, even hunger. I never heard one curse the mule he was driving, the tools or material he was handling, his companions nor any thing or person with which or whom he had to do. Boatmen in the bays and rivers are, as elsewhere, full of rivalry, chaff, fun and badinage, but not, as elsewhere, violent nor abusive. I never heard of a woman being struck, except one case of a drunken man who cut his mother's arm after stalling his brother. (He was the *alcalde* of the village. Who ever heard of an American Justice of the Peace committing an outrage?) I never saw a child beaten in Honduras, and I must also record that I never saw one caressed much either.

It must be understood that I speak of the lower and middle classes, my business not having brought me into contact with the high society of the capital, a loss which, from what I have heard, I need not greatly deplore. In politics the country is, like other Spanish-

American countries, a republic in name, a petty oligarchy in fact. I have thus far said nothing about

## The Mines.

I saw but few of them, and what I did see did not impress me very favorably; however, my journey being for a specific purpose, embraced but a small portion of the country, a fact which must be borne in mind in estimating the value of these notes. There is one paying mine in Honduras, the Rosario, near Tsgucigalpa the capital, which is yielding about \$60,000 worth of silver monthly, but pays no dividends. A number of mills and smelters are being erected at other points. Several prospectors with whom I conversed expressed unfavorable opinions as to the mining prospects of the country. To those who may propose going to Honduras, with the expectation of traveling about the country, I will say that they will consult their comfort by making their visit during the dry season, that is, between November and May, and by providing themselves with blankets, folding cots or hammocks, table-knives, forks and spoons, tin cups, toilet articles suitable to their habits, rubber clothing, or better mackintoshes on account of hot weather, which is injurious to ordinary rubbers; condiments, if they want such, as pickles and sauces, a stock of flea powder, good saddles, etc., suitable for small mules and provided with two cinchas or else with cruppers; it is also a good plan to carry a portable cooking outfit in the dry season, as it may be desirable to camp out sometimes, which is not feasible in the rainy season; also plenty of patience and a disposition to accommodate themselves to the customs of the country instead of going through it kicking and growling, as most of us do, because things are not as we are accustomed to find them in our own country.

Arms appear to be superfluous, but I will remark, for the benefit of those who may wish to carry revolvers, and few would care to go without them, that cartridges of .38 and .44 caliber can be got in any town, while those of .45 cannot often be obtained.

Compared with the profusion of this vegetation (in the wet season),

## Animal Life is Scarce.

With the exception of fleas, which abound, and rehound, and grasshoppers which go in swarms and destroy the milpas, as the plantations of corn, etc., are called. It is a coincidence that these two pests of the country both "have legs above their feet to leap without upon the earth," yet, notwithstanding scriptural authorization, neither is considered fit for food, though the one destroys the people's food and the other attacks the people themselves. Of game, we saw only two deer and a few doves, and of venomous creatures, except fleas, one scorpion and one snake. Birds were not plentiful, though I saw one flock of macaws, whose gorgeous plumage contrasted finely with the tropical foliage. In the dry season, it is said that parrots abound, and it seems likely that reptiles and venomous insects may be more frequently met with, yet the annual burning of the brush and grass by the people must tend greatly to the destruction of vermin. Monkeys and tigers are reported in the high mountains, and alligators in the rivers, though we saw none. The scarcity of fruit in this tropical region was a surprise to me, and vegetables are not plentiful on the dinner-tables, rice seeming to take the place of potatoes, etc.

## As to Money.

American gold commands a premium of 30 per cent in the silver currency of the country, consisting mostly of Peruvian sole and fractions, which consequently suffers a relative discount of a very small fraction over 23 per cent as to gold. The difference between premium and discount is sometimes lost sight of by the uncommercial traveler, the figure given is near enough for all small transactions. X.

## Tracing Ancient River Channels.

EDITORS PRESS:—Will you be clever enough to publish the following explanation for me? I wish to be fairly understood in this matter by the public.

I have discovered how to trace up ancient river channels and determine the class and locality of their regular deposits either under or on top of the ground. This is purely a scientific discovery not to be done by any one off-hand, but it will take a man with the heat of scientific judgment to do it successfully, and he will have to carefully study his work. Then he can go at once to every point where the deposit would be, if any was made; but if no gravel is left, that place is prospected and he has nothing to do but to go where the next deposit would be formed. It cannot always be told to a certainty beforehand whether a deposit has been left or not. But experience may render a man's judgment almost a certainty. But there will always be men who will excel in this as well as any other business.

Now this is one of the most important discoveries ever made in gold mining, and it has baffled the skill and capital of the world to find it out, but is easy enough to a man when once understood. It will make gravel mining as well understood as any other industry, and render investments just as safe and as certain of success as farming is in California to-day. I claim that it will enable a miner to under-

stand the probable value of his property just as well without the actual facts and enable him to understand what is and what is not mineral land, so far as gravel goes. But, understand, it is not to be always told whether there is gold in the surface dirt or not where there is no channel, and it has nothing whatever to do with quartz. It is simply to understand physical geology, which your purely scientific man does not.

H. CLENDENEN.

Rough and Ready, Nevada Co., Cal.

## The Mexican Iron Mountain.

[Translated for the Press from *El Minero Mexicano* by M. N. M.]

The Mexican Iron Mountain Manufacturing Company of Des Moines, Iowa, was organized with the object of securing the property of the Iron Mountain Company of New York. The property is situated near the city of Durango, Mexico, and was acquired by this company July 6, 1886. It comprises the Rancho de Murga, which contains about 43,000 acres of productive and timber land. It extends from the limits of the city of Durango toward the west nearly 30 miles and possesses very valuable water rights and privileges. It has also foundries, machine-shops, blasting furnaces and hoisting machines almost complete and ready for operation. The property of no value acquired by this company is a mountain of mineral iron called the Cerro del Mercado, situated two miles north of the city of Durango, which has 30,000 inhabitants. The Cerro del Mercado is one mile long, one-third of a mile wide and 400 to 600 feet high. The surface of the mountain, the mineral of which is of excellent quality, is 10,000,000 feet square, but there are indications that the deposit is not all *flor de tierra*, but it increases as the soil is removed. The magnitude and wealth of this deposit has attracted the attention of men of science during the last hundred years. The Encyclopedia Britannica mentions the Cerro del Mercado as one of the four most famous deposits of magnetic iron on the globe. Humboldt,

## In His Great Work on Mexico,

Treats especially of this mountain and suggests as a possibility of its origin that it was an immense aerolite which had fallen there. Ward's History of Mexico, edition of 1829, says that the Cerro del Mercado is composed of two distinct qualities of metal (crystallized and magnetic), both equally rich, since both contain from 60 to 70 per cent pure iron. Vol. 2, p. 522. "I believe that in no part of the world a situation can be found which combines all the advantages of this to facilitate exploitation," and adds, p. 292: "In the vicinity of the capital (Durango) materials of construction abound. Lime and stone can be obtained almost at the doors of the city." The following is an extract from the report of John Birkinbine, secretary of the American Charcoal Iron-Workers' Association: "Considerable time was employed in examining the mountain, ascending its elevated declivities and collecting specimens on its surface. I am not disposed to confirm the opinion of some authorities declaring the deposit to be a solid mass of iron, although nearly all the surface presents the mineral to sight. I am inclined to believe that the Cerro del Mercado is formed of one or more

## Immense Veins of Mineral

Of specular iron arranged almost perpendicularly, and whose fragments by the action of the elements in the course of ages, have been hurled down, forming the declivities of the mountain; but the extent of this mineral detritus is too great to permit the localization of any foot or perpendicular wall. However, the study of the formation of this great interest has no importance for your present consideration, because the quantity of mineral which is in sight is practically inexhaustible, and the question whether the mountain is a solid mass of mineral or whether the overtopping little towers which rise from the declivities are parts of the great veins, will not affect its value as a source of production for generations to come. I have then only to verify the computations formed by others upon the number of hundreds of millions of tons of mineral which these deposits contain." Hon. Joseph Nimmo, statistician, in his report to Congress entitled "Commerce between Mexico and the United States," says, p. 18: "The mountain of iron del Mercado in the State of Durango can supply all the furnaces and foundries of Great Britain at the present rate of consumption for more than three centuries. This vast deposit of mineral iron would represent many millions of dollars if it were in the United States. It is worth more where it is. Mexico imports the iron which it consumes. There is not a pound of steel manufactured in the Republic, and very little iron. Nails sell by wholesale at \$16 to \$20 per barrel, and the common hars of commerce at \$210 per ton in the City of Mexico, which is the greatest and cheapest market of the country. In the shadow of that immense mountain of iron, the bar of that metal manufactured in England is \$230 per ton. The same class of iron can be bought to-day in Chicago for \$38. The enormous duty and cost of freight represent the difference in value. That difference will leave a great margin in favor of this company on all the products manufactured." Many enterprising citizens of Iowa are interested in this famous property.



## Mexican Mines.

## The San Miguel Mine.

EDITORS PRESS:—In a former letter I acquainted your readers with a short history of a mining enterprise, and with some of the results which followed the intelligent application of English capital and English stamina by the working of Las Minas Prietas in this State of Sonora. To-day the history of another large mining enterprise, requiring the expenditure of a large sum of money for machinery only, by similar British enterprise and pluck, may interest some of your readers.

The Sonora Silver Mining Company (limited) of London owns the San Miguel silver mine, situated, lying and being near Soyopa, in the center of a rich mineral district, containing, among numerous others, the Nochs Buena, la Barranea, los Bronces mines. The San Miguel mine was discovered in 1870 by Don Joss Arviso, who took out very rich chloride ore from the surface. He, with three partners, worked about one year without any system at all, or only that which the German miner tersely calls *raub bau*—robbing the mine—which yielded from 50,000 to 60,000 ounces silver per month, with a force of about 50 men in mine and hacienda, containing the arastras. The mine having been sold to new owners, was worked thus in the old way for two years more, enriching whomsoever came in contact with it. Meanwhile the ore changed its character from chlorides to sulphurets, antimonial and arsenical silver ore, and the owners knowing nothing of the economical treatment of this kind of ore, and greedy for more wealth, and entirely regardless of the security of their workmen and of the mine, began to take away its pillars of rich chloride ore which had to be left standing.

For a short time things went on smoothly, as the short-sighted and ignorant owners fancied, till their foolish policy bore its legitimate fruit—all natural supports having thus been taken out of the mine without replacing them with artificial ones, a general cave occurred on Good Friday, 1875, which put a stop to all further work; it being a feast day, happily no miners were at work, otherwise all would have been killed.

In the meantime a lot of the sulphurets ore having been sent to a mill owned by Don Miguel Lopez and treated successfully by a German metallurgist, proved to the mill-owner the value of the mine, and he purchased it, associating with himself two experienced German miners and metallurgists.

A new tunnel about 600 feet long and considerably below the old works was run, and having struck the vein of the rich sulphurets ore, ranging from six to ten feet wide, occasionally widening even to 30 feet, and averaging 150 ounces silver per ton, the development of the mine and subsequent extraction of these rich ores began, and with it an era of extravagance such as miners and gamblers only are capable of. Fast living was the order of the day, champagne flowed like water; new sources of expenditure were sought for and hailed with delight. An expensive road over the mountains was constructed, a costly mill for pan amalgamation was built and afterward changed for the lixiviation process; large and fine buildings for offices and residences erected; a new tunnel driven 500 feet through hard rock and then abandoned before completion owing to bad air; in short, many untimely, useless, reckless and profligate expenditures indulged in, which naturally brought in their train bad management, dissensions and finally costly law-suits between the owners, all of which resulted in Lopez's sole ownership of the whole concern.

Don Miguel Lopez then worked the mine alone, extracting and beneficiating large quantities of medium and high-grade ores, but neglecting this branch of his business for his land and cattle interests. Leaving incompetent and dishonest men in its charge, he ran the mine into debt, and this, in conjunction with Apache troubles and a mill sadly in need of repairs, forced him to dispose of his interest to the house of Ortiz in Hermosillo. It is estimated from what is shown by the books of this house and by the records of the mint in Hermosillo, that over eight millions of dollars were produced by this one San Miguel mine.

This valuable property passed about one year ago into the hands of the Sonora Silver Mining Company, which is now contemplating the erection of machinery capable of concentrating and reducing 150 tons of ore daily, using water-power by a ditch from the Yaqui river. Experiments made by O. Pletz, M. E., to whom I am indebted for all this information, show that 10 tons of ore may be concentrated into one ton of the value of 200 to 400 ounces silver per ton, varying of course according to the

nature of the ore and the levels from which it is extracted.

In my next I propose to give you some information about a similarly situated mine in the Magdalena district, only 25 miles from the Sonora railroad, which mine or mines contained the same chloride ores as found in the San Miguel mine, which subsequently were followed by so-called rebellious silver ores, which facts induced or rather compelled its ignorant former owners to dispose of it, and which necessitates only the economical and intelligent expenditure of about \$10,000 to \$15,000 to place it on the Bonanza list; that is,

and machine shops will furnish, as they do already now, the supplies aside of the *nerus rerum* of all mining enterprises.

THEO. G. ED. WOLLEB.  
Hermosillo, January, 1888.

**WIRE BELTING.**—The first pisos of belting made with wire has been manufactured at Beaver Falls, Pa., by J. E. Emerson and Thos. Midgely, under patents taken out by the latter. The piece is 40 feet long and 4 inches wide, and is made from No. 20 steel wire. It is said to be as pliable as leather; in fact, more so, and will wrap around a one or two-inch shaft with



FIG. 1.—VIEW OF AN ANCIENT CORK-OAK IN PORTUGAL.



FIG. 2.—VIEW OF A GIANT CHESTNUT IN PORTUGAL.

to open it sufficiently to extract ore. The building of reduction works is another question yet not to be dismissed until the mine is yielding freely its hidden treasures. It is useless to expect that the formerly so enterprising San Francisco mining men (if there are any left) will take hold of a mine across the line, in fact it would be difficult to find a mining clique more afraid of Mexico than the Californians are; and thus the property will attract Eastern or European capital, and naturally too the flow of the silver bullion will turn eastward over the Rockies instead of in its natural western course. Eastern men naturally patronize their own markets for machinery and mining necessities, and therefore Chicago and St. Louis foundries

outstraining the wire. The link arrangement is similar to that of the flat gold chains worn by gentlemen and ladies, and presents a handsome appearance.

**A NEW FUSIBLE PLUG FOR STEAM BOILERS.**—The fusible metal is supplied in the form of a ring, into which is driven a plug of gun-metal. The fusible metal is thus between two good conductors, and is, therefore, admirably placed for prompt action; at the same time it is so far removed from the furnace, and protected by the cup in which it is set, that it can only be fused by the boiler-plates getting hot—a consideration of importance. The plug, we understand, has already come into extended use.

## Two Giant Trees in Portugal.

As we are growing both cork oaks and Spanish chestnuts in this State, it may be interesting to look forward and see what coming centuries may behold in California. The engravings on this page and the following description by M. Charles Joly of two giant trees in Portugal, will give suggestions for such a forecast. M. Joly kindly sends us a little pamphlet containing an extract from the *Journal de la Société Nationale d'Horticulture de France*. A translation for the PRESS is prepared by our obliging polyglot M. N. M.

Among the curiosities deserving the attention of the hot-airists and travelers are the colossal trees found in certain regions where people have respected the work of nature. Of these giants I will mention a cork oak (Fig. 1) and a chestnut (Fig. 2), the photographs of which were sent to me by my friend M. Duarts de Oliveira of Oporto.

It is a well-known fact that the coast of the Mediterranean is specially favorable to the growth of the cork oak (*Quercus Suber* L.). It requires a climate, which, if not hot, must be, at least, but little exposed to sudden changes of temperature and to rigorous cold.

When the tree is virginal, that is to say, has not yet been stripped of its bark, it can easily resist the inclement seasons; but when it has been denuded, the cold air and the excessive heat are equally prejudicial. In former times cork was used only for stoppers, but now it is used by builders, hat-makers and for machinery. From it are made caskets de visite, and of etiquette, carpets, life-

preservers, hnoys, etc., and the residue is ground by machinery for packing purposes. Algeria, like Tunis and Morocco, possesses wonderful forests of cork-oaks. They are likewise found in Catalonia and Andalusia.

France has forests of them in Provence, Gascony, the Landes and in Corsica. In Portugal there are very extensive forests in the provinces of Estremadura, Alemtejo and Algarva. The latter country exports to England a considerable quantity of cork, which is returned to Portugal in the form of stoppers for the famous wine of Oporto so esteemed by our neighbors. Cork is to day a very important object of commerce in Portugal, and day by day its value increases. In 1867 it was 0.15 fr. the kilogr.; now it is 0.25 fr. In the provinces of Alemtejo and Algarva the acorns are gathered to be fed to the hogs, the superiority of which animal is attributed to this alimentation.

It is in Portugal that the colossal oak, the subject of this notice, is seen. It is on the property of M. le Vicomte de Rohoredo, and is called in that country *Herdade de Torre*. It is 500 meters north of the chapel of St. Goncalo, upon the Palmella road, and 15 kilometers south of Lisbon. It measures nine meters (nearly 30 feet) in circumference at one meter from the ground; is 18 meters (nearly 60 feet) high, and its diameter at the top is 20 meters (about 66 feet).

The tree is regarded by the people of the vicinity with a kind of veneration, and they respect it as the Druids did their forests. It has still a great part of its first bark, which, at certain points, exceeds 20 centimeters (about seven inches) in thickness. The exterior of the trunk does not present any cavity. Sometimes the yearly yield is abundant and a product of 800 liters (about 22 bushels) of acorns is not unusual. M. Carlos Pimental, a learned Portuguese silviculturist, thinks that this oak is the dean of the forest, and that it must be at least 400 years old. There are in the vicinity other oaks of from four to six meters in circumference.

The second colossal tree (Fig. 2) is the chestnut of Alconogosta, which is upon the northern declivity of the Gardunha mountain, near Fundao, at an altitude of 800 meters (about 2600 feet). At that place are found trunks of considerable diameter. Unfortunately, however, their branches have been cut off for use in building. The most colossal tree among them is on the road from Fundao to Alconogosta. Since it was lopped about 20 enormous branches have grown out. The trunk is six meters (about 20 feet) in height and 14 meters (about 46 feet) in circumference at one meter from the ground. An opening on the north side, three meters in width, gives access to the interior of the trunk. When it had all its branches its diameter was 20 meters, and its shade covered a surface of 150 square meters, or about 1600 square feet of area.

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## SAN FRANCISCO

Saturday Morning, Feb. 11, 1888.

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## Passing Events.

Several matters of interest to miners are now before Congress, among them the Stewart Mining bill, to which we refer elsewhere. It seems also that the Hearst amendment to the Alien Act, allowing aliens to hold mines, is to be modified to exclude the Chinese.

The reduction of miners' wages at several of the leading mines in the Wood river region, Idaho, has been contemplated for some time, but has only now been put into effect. It is hardly probable, under the circumstances, that any first-class miners will remain there or go there; and if they get second-class men they will get second-class work.

It is worthy of note that the Anaconda Co., Montana, will soon discard their ordinary stamps and use a steam stamp. The Homestake Mining Co., Black Hills, Dakota, are about to do the same thing.

The high price of coal has stimulated prospecting for coal veins all over the coast. Some new mines have been opened and a number of old ones are to be worked again, now that prices warrant it.

There is great opposition to the Polish miners at Reading, Pa.

GYPSUM FIELDS in Kern county are attracting attention.

## A Fit Basis for a National System of Finance and Currency.

Some time since our Government sent an agent to Europe to ascertain and report what chance, if any, there might be for inducing the leading European Governments to join ours in an effort to fix the relative values of gold and silver, and to take measures looking to the adoption by them of a bi-metallic currency. After due inquiry, this agent reports that, while there exists among certain parties in the countries by him visited a strong sentiment favorable to both the above objects, they are stoutly opposed by the ruling classes in England as well as on the continent. The opinion is expressed that, while the doctrine of bi-metalism is there gaining ground and will ultimately prevail, it will probably be a long time before it takes practical effect. Such being the case, it looks as if the United States Government might venture to cut loose from these Old-World peoples with their narrow and benighted methods and adopt such financial system as our peculiar circumstances seem to require.

We noticed not long since the bill introduced by William M. Stewart in the United States Senate, substituting certificates of deposit for gold and silver coinage, commenting favorably on the provisions of the same. That bill, which embodies our idea of a fiscal policy worthy of acceptance by the American people, is, we are glad to see, gaining favor with the masses everywhere and with all classes of the community in the silver-producing regions of the West, where, if adopted, it would tend to greatly promote that industry. The workings of that bill would not only be equivalent to the free coinage of silver, but it would relieve the producer of that metal from being obliged to pay, as at present, the expense of its coinage, while increasing its value over present rates fully ten per cent. In superseding the circulation of coin, as it would do to a large extent, there would be saved the loss caused by the wear of the precious metals through their constant use. When one of these certificates became badly worn or otherwise rendered unfit for circulation, a new one could without much expense or trouble be issued to the holder. Then, for purposes of remittance, this would be a safe, cheap and convenient medium, as these certificates to any amount could be sent through express or mail, the holder, when he desired to do so, being able to readily convert them into coin. These certificates would, in fact, possess every element of a perfect currency. We should have bi-metalism unrestricted and in its best form. The value of gold and silver, absolute and relative, would be fixed, certain and permanent. Whether they existed in bars, ingots or coin, this would be the case. When deposited for the issue of certificates they would require to contain 90 per cent pure metal. Every gold dollar represented by these certificates of deposit would contain twenty-five and eight-tenths grains of that metal, and every silver dollar four hundred and twelve and one-half grains of that metal, each of the above fineness.

Under this system, there being no fluctuation in or uncertainty about the value of the precious metals, there could be no speculation in them. Silver ceasing to be a mere commodity, as at present, would no longer be bought and sold on an ever-varying market. It would become a veritable money, and as such be just as much a measure and standard of values as gold. Under this new order of things London would no longer be the silver mart of the world, nor would the price of that metal depend on the daily caprices of her bankers and money-changers.

We produce more than four times as much of the precious metals as any other country in the world; nearly twice as much as all other countries combined, and ought not to be taking lessons of these non-producers or shaping our monetary policy with reference to their interests and desires, much less to the whims and vagaries of their theorists. We should adopt a system suited to our own conditions and wants, and, going our own way, leave the rest of the world to go theirs. If mono-metalism suits them let them adhere to it. If they choose to ostracize silver it is their privilege to do so. As for these United States, with their phenomenal growth of population, wealth and industries, they can no doubt stand it. There can occur here no

glut of the precious metals. Even when our present product of gold and silver shall have doubled, as it probably will do in the next 20 years, we shall have room and use for it all.

We may properly leave to England, Germany, and their allies, the business of buying and selling silver and of decrying its use as a money. This for the moment seems to suit their interests, and that is all they care for. Timid and short-sighted, they act prematurely and precipitately, being unable in the presence of great events to grasp their significance and probable outcome. When gold was discovered in California, fearing a glut, they denounced that metal. When the Comstock find was announced to the world, overrating its importance, they reinstated gold and declared against the use of silver, forgetting that the population and business of the world are increasing at a much more rapid rate than the product of the precious metals, which, were both to be accepted and used without discrimination, they would still be insufficient to meet the growing demand for a monetary medium. It is in these old countries a difficult thing to turn the car of progress from its track or even make the attempt, they who run it fearing such effort might dangerously strain the machine. Hence it is suffered to lumber along in the old rut till there occurs a final smash-up to the dismay of all concerned.

## Relocating Claims.

In another column are given the provisions of Senator Stewart's new mining bill. Among them is one which provides that no person shall relocate a claim which he has previously located.

At first thought it would seem that such a provision would work a hardship to miners, and in a few cases it might; but when the matter is properly considered it will be seen that the idea is a good one. In effect it simply carries out more forcibly and in express terms the idea that the original laws of May 10, 1872, intended.

At that time we copied an idea from the Mexican mining laws, which was to compel men to do work on their claims or give them up to some one who would. The United States for the first time required a specified annual expenditure on claims, not leaving it to the different districts to regulate this. But unfortunately it was provided that the mine could be relocated provided that the original locators or legal representatives had not resumed work after failure and before a relocation. The practical result of this has been that a good many men did not work at all, but simply were on hand on the 1st of January and relocated the claim themselves. In this way they evaded the law, and still continue to evade it.

The mining laws of the United States are most liberal. Any one who finds a claim on public land can take it up as his own property. He has not got to pay a cent for it unless he gets it patented. He can work it for 20 years or more without patenting it if he wants to; or he can work it all out and never pay anything at all. He is not compelled to patent it unless he wants to. Surely nothing could be more liberal.

Yet the laws are evaded persistently, and especially in this matter of annual expenditure. It would seem that after a man has held a claim for a year he would know whether it was worth anything or not. At any rate, if he has tried to find out he has expended in labor or money enough to hold it under the law.

And that is just the point. The law is designed to protect the miner who in good faith tests his claim by working it; and is designed to force the man who does nothing to give up to some one who will work. Senator Stewart's bill effects both these points better than the present laws. If a man does nothing for a year on a claim he has located, let him give it up to some one who will. It will be much better for the mining interests, and will prevent one man holding a dozen or so claims without working any. The best thing for the mining interests of the country is for the claims to be worked. If the locations are no good, abandon them; but to leave this undetermined for years in succession does no good to any one.

THE rates on ore from Hailey, Idaho, are \$17 to Denver, \$20 to Omaha, \$21 to Kansas City and \$13 to Salt Lake.

## California Iron and Steel.

There is only one iron mine in California which has ever put any pig iron on the market, and that is the Clipper Gap mine, in Placer county, California. A disastrous fire occurred at the works over a year ago, since which time nothing has been done. The California Iron and Steel Co., which owns the property, held a meeting this week.

The report of the Board of Directors for the past year showed the corporation to be in a more satisfactory condition than was the case at the last annual meeting. The report specifically mentioned some of the resources of the company, among them being 7960 acres of land in Placer county, for which an offer of \$25 an acre had been obtained. There were the mine, machinery and other improvements, worth about \$30,000, and the mills at Emery Station, valued at \$70,000. As against these resources, there were outstanding bonds to the amount of \$39,000, with accrued interest of nearly \$15,000. As to these bonds, the bondholders had offered to accept \$67,000, which would be a very material reduction in case the affairs of the company could be brought to that state where cancellation of the indebtedness could be accomplished. The report figured the available resources at \$290,000, and the total liabilities at \$140,500. This would leave a net balance of \$149,500, or about \$7.50 a share. The attorneys for the stockholders, who had instituted suits against the directors, who, it is said, declared and paid six dividends by creating an overdraft of \$39,500 at the First National Gold bank, had given assurances that the stockholders would recover the full amount sued for. If this amount is added to the \$149,500, the net resources would be increased to \$189,000, or about \$10 a share.

Some stockholders thought the estimated value of the Emery Station property too high, but competent appraisers had placed it at \$70,000 to \$75,000. The treasurer's report showed receipts for the year to be \$6525.05, and disbursements amounting to \$6496.73. Efforts are being made to harmonize the differences between the stockholders and bondholders, but until this is done nothing else can be accomplished. The following Board of Directors was elected to serve for the ensuing year: George D. Dornin, George W. Gibbs, W. Murray, Charles Pace and Andrew Baird. George D. Dornin was chosen president; George W. Gibbs, vice-president; First National bank, treasurer; and F. Bonacina, secretary.

LICK OBSERVATORY ASTRONOMERS.—Mr. E. Barnard, noted for his astronomical discoveries, and one of the recently appointed astronomers of the Lick Observatory, has just been elected a member of the Royal Astronomical Society of London. This honorable distinction came unsought. S. W. Burnham is also a member of this distinguished society, and Prof. E. S. Holden has been for some years one of its 50 foreign associates. Chas. B. Hill of this city was this week appointed by the Regents as assistant astronomer of the Lick Observatory. This talented young gentleman has long been an assistant of Prof. Davidson's at the Davidson Observatory, San Francisco, and is one of the two astronomers of the Chahot Observatory of Oakland. This appointment of a young Californian is an eminently proper one. Mr. Hill is an enthusiastic astronomer, has plenty of ability and ambition, is a good mathematician, and ought to be able to fill satisfactorily the position for which he has been selected.

MINERS' WAGES IN IDAHO.—The Minnie Moore, Queen of the Hills and Relief mines at Broadford, Idaho, have notified the miners in their employ that hereafter their wages will be at the rate of \$3 per day. This move on the part of these large mining enterprises will no doubt cause others to follow suit. It is stated that the miners, all of whom belong to the Knights of Labor, will quit work. Quite a number have left through the winter owing to the reduction of the working force on the mines in the Wood river region, which they took to be a sign of a reduction in wages. Some 40 or 50 went to Aspen, Colorado. A few went to Butte and Virginia City, and a very few to Utah. If the rest have to leave, the most of them will go to Colorado. The former rate of wages was \$3.50 per day, and the cut is therefore one of 50 cents per day.



## Hints to Prospectors.

## Plants Which Indicate the Presence of Mineral.

In ancient days more or less attention was paid to the presence of particular grasses or shrubs and the general appearance of the flora in searching for minerals.

Agricola, (*De Re Metallica*) after describing the manner in which veins outcrop, or can be traced by "float" from their outcrops, offers the following remarks concerning the relations between vegetation and underlying veins:

"Then we study veins by observing the hoar-frost, by which all plants are whitened except those which grow upon veins, because these emit a warm and dry exhalation, hindering the congelation of moisture; wherefore such plants rather become wet with water than white with frost—as may be observed in all cold places, before the plants have come to their full size, as in April and May, or when the late hay, which is called *cordum*, has been cut with the sickle, as in September. Wherever these humid plants do not congeal with hoar-frost, there is a vein beneath. If this exhales very warmly, that ground bears low plants, not of lively color. Lastly, trees, the leaves of which in spring are bluish or livid, the upper branches in particular being affected with blackness, or some other unnatural color, the stems cleft, and, like the branches, black or discolored; for these are the effects of very warm and dry vapors, which do not spare even the roots of the trees, but, burning them, render them weak. For which reason the force of the winds more frequently destroys trees of this kind than others; but it is veins that emit the vapor. Wherever therefore many trees, situated in a given long line, lose their vigor and blacken or become discolored at the most unseasonable time, and are frequently overthrown by the force of winds, there is a vein beneath. But when likewise along an extended course, where a vein stretches, a certain plant or a certain kind of fungus grows, which is absent from intervening lines, or even from neighboring veins [this also is a sign]. And in these ways veins may naturally be discovered."

Mr. R. W. Raymond, the accomplished secretary of the American Institute of Mining Engineers, in a paper before that society, states that there is a significance in this brief allusion to particular plants or fungi as growing over particular veins. It shows that this phenomenon has been observed. In his paper on "Indicative Plants," from which we quote, Mr. Raymond says: "The general relation between the flora and the geological formation of any given district is a fact familiar to field geologists. It is often possible after the necessary local practice to follow the lines of different rocks by this sign alone through areas where there are no exposures. Here, doubtless, we have to do with causes which chemical analysis of the soil will reveal, aside from those which depend upon moisture and temperature only. And we are prepared to believe it possible that not only the proportions of silica, lime, alkalies, etc., in the soil, but also the presence of metallic combinations may exert an influence upon vegetation.

"A striking instance—the only one so far as I know, which has been scientifically investigated heretofore, is that of the zinc-violet (*Galmeiveilchen*) or *Viola calaminaria* of Westphalia, peculiar to the zinc deposits of that region. I translate from its reprint in *Poggendorff's Annalen* (xvii., 175), a paper on this subject by A. Braun, which appeared in the monthly report of the Berlin academy for January, 1854:

"It is known that the calamine-bearing hills of Rhenish Prussia and neighboring parts of Belgium possess a peculiar flora. The traveler in that region is particularly surprised by a violet, related to *Viola tricolor*, which unfolds its numerous beautiful yellow blossoms in uninterrupted succession from spring to late autumn, and is generally known in the neighborhood of Aix (near Stolberg, Hergenrath, Vieille Montagne, etc.), by the name *Galmeiveilchen*, or in the local *patois*, *Kelmeveilchen* or *Kelmesblume* (calamine-violet, calamine-flower).

"The mining officials of Vieille Montagne assure me that the zinc-violet cannot be cultivated in gardens without reverting to the characteristics of the ordinary *tricolor*. This prob-

ably refers to a change in the color of the blossoms only—a point concerning which experiments already begun in the Berlin Botanical Garden may give further light.

"The occurrence of *V. calaminaria* in a relation so constant to the zinc contents of the soil that successful mining explorations are undertaken on this sign alone, led me, during my visit to Aix last year, to request Mr. Victor Monheim of that place, who is eminent as a mineralogist and chemist, to make a chemical examination of this plant, with special reference to possible traces of zinc. Mr. Monheim courteously acceded to my wish, and sent me in November the following report... from which it must certainly be concluded that to the 18 elements hitherto known as entering into the structure of plants, zinc must now be added.

## Observations on Mount Hamilton.

We had an opportunity this week of conversing with Mr. Alvan G. Clark of Cambridge, Mass., one of the makers of the big lens of the Lick telescope. Mr. Clark is the youngest son of the famous Alvan Clark, who died just after the completion of the Lick lens. He has been for some weeks at the Lick Observatory on Mount Hamilton, attending to certain details connected with the telescope.

Mr. Clark was wonderfully pleased with the clearness of the atmosphere at Mount Hamilton, and the facility which it offers for astronomical research. While there he had the great pleasure of discovering a new star—the seventh star in the trapezium of Orion. This star has never been seen before. He says the



A PLANT INDICATING THE PRESENCE OF ZINC.

"Abstract of Monheim's Report on Analysis of *V. lutea calaminaria*.—Plants collected in October, in parts still in flower; freed from adhering earthy particles by washing; treated with water acidified with hydrochloric acid for 16 to 18 hours, until no more inorganic matter was taken up. The finely-divided plant was then treated with HCl for 12 hours in a water-bath, and in the decoction thus prepared zinc was detected by the usual method. Zinc was also detected in the sap of the plant."

I am informed that the late M. Tessie du Motay recognized this zinc plant at the Horn Silver mine in Utah, the ore of which contains a considerable amount of a curious flesh colored zinc-blende.

The engraving is a life-size sketch of *V. calaminaria*, made from a specimen in the herbarium of Columbia college.

A SHORT TIME ago a peasant plowing at Tjoring, in Denmark, unearthed a handsome armlet of pure gold weighing 12 ounces, which, according to the director of the Museum of Antiquities in Copenhagen, dates from the second or third century, A. D.

discovery is very important for two reasons: "It shows the power of the telescope at the Lick Observatory, proving it to be the strongest in the country—the strongest in the world; and it also shows the advantage the observatory has over nearly all others in the United States in the matter of locality. I think in that respect the people of the Pacific Slope are to be congratulated. I have looked through the telescope from my home in Cambridge for new stars in the trapezium of Orion, and have been unsuccessful in the search. On Mount Hamilton, however, the discovery is made almost the first night we try the instrument. This star is within the trapezium, and it is, I think, the only one that has ever been discovered there. There have been seen six stars about Orion, and this makes the seventh."

Mr. Clark has visited most of the noted observatories, and is naturally very well posted on the subject. The Lick Observatory has advantages possessed by no other—the clearest atmosphere and the largest telescope. The "glorious climate" was not up to its usual mark during his visit, and although he is from

cold Massachusetts, he suffered from the cold more on Mt. Hamilton than ever before. The severe wind and the insufficiency of heating apparatus combined toward this result. Some changes will be made in the arrangement of the plumbing at the observatory, and some also in other departments, after the experience of this exceptionally cold winter. Considerable work yet remains to be done before the observatory will be turned over to the University Regents.

Mr. Clark is confident that, with the very efficient corps of observers and the complete outfit of instruments, the Lick Observatory will bring fame to California. The corps will compare favorably with any in this country or Europe. Mr. Clark had a good observation of Saturn and was delighted with the detail he was enabled to study. The tests with double stars were also highly satisfactory. While the weather was unpropitious during his visit, he was nevertheless enabled to make such observations as convinced him that at no other observatory was there such an opportunity of making important discoveries and observations as at the Lick on Mount Hamilton, Santa Clara county, California.

## The Scarcity of Coal.

Coal of all kinds continues very scarce in this market, and prices are ruling very high. While this is a great inconvenience to domestic users, it is still more so to manufacturers. One large flouring-mill in San Francisco has had to close down and discharge its men, and it is thought some other large establishments will have to do this also.

There has been an enormous increase in consumption of coal in this State, with which coast production has not kept pace. The disaster at the Wellington mine and the shutting down of the mines there as well as at Nanaimo has shortened our coal product about 1000 tons a day. The miners at Nanaimo and Wellington have been holding meetings at both places during the past week for the purpose of discussing a better protection to miners and to decide on a different basis of working. The result of the inquest proved that the disaster was caused by badly placed shot, and in future all drill-holes will be examined by a competent man before being charged, to determine whether the shot will do the work calculated upon. The owners of the collieries have agreed to discharge all Chinese help, so the miners have gone to work again.

Rails enough have arrived at Seattle to finish the Seattle, Lake Shore & Eastern railroad to the Squak coal mines. The Squak mines are owned by the Seattle Coal and Iron Company. They are new ones, with veins 10 feet thick, and of good quality of bituminous as can be found anywhere. New bunkers have been built at Smith's Cove similar to those on the Jarvey Central road in New York harbor. The mines can ship 1000 tons a day.

A number of vessels are on the way to this port with cargoes of foreign coal, but it will be some time before supplies will be able to replenish stocks. All the coast collieries are exerting themselves to produce as much as possible.

THE ROTARY SNOW-PLOW.—The new form of rotary or "propeller" snow-plow now coming into use on the railroads of the West is of Cook's patent, and is very effective. Several years ago, Oliver Hyde of Benicia wrote to the managers of the S. P. R. R., suggesting this form of plow—that is, one with a propeller or front to cut its way. Mr. Hyde had used rotary plows on land and had been experimenting in that direction. The managers of the road, however, did not believe in the principle. They thought the plows they were using were the best that could be made for roads where the snow falls eight or ten feet. These could only be used by having 10 or 12 engines behind each one and forcing the plow into the drifts. They thought the rotary-propeller principle would be a detriment. But they are using a rotary snow-plow now and it does first-rate work—much better than the old-fashioned ones.

E. J. PERRY has discovered new mines in the Summit Springs range, about 50 miles southeast of Winnemucca, Nev. Several locations have been made, all of which look well. One of the ledges is about 30 feet wide, with streaks of ore through it which assay from 55 to 99 ounces in silver and 66 per cent lead, and from \$4 to \$6 per ton in gold.



## MECHANICAL PROGRESS.

## The Lathe—The Oldest Machine Tool.

The oldest machine tool known is the most valuable. It contains the germs of all others, whether rotary or reciprocating, and can be made to take the place and do the work of any one of them at a time, and all of them as desired. Its origin is lost in the mist of prehistoric times. It is as old as the loom, and was used by the oldest nations. As constructed in these times, it has reached great perfection, and is made in various special forms; there are boring and chucking lathes, turning lathes, screw-cutting lathes, drilling lathes and polishing lathes. But a screw-cutting lathe with rack or friction feed, and the other ordinary appliances of a complete lathe, comprehends in its capabilities almost all the offices of the other special tools used in the machine shop.

Take a single instance of its capabilities, the production of a screw tap. The lathe will cut a piece from the steel bar; it will drill its centers and countersink them; turn the tap, whether straight or taper; cut the thread on it; score the tap, either by a cutter in the tool-post while the tap is suspended on the centers of the spindles, or by means of a rotary cutter or milling tool on the spindle centers while the tap is held on temporary centers on the tool carriage. Even the top end of the tap can be squared by similar means for the reception of the tap-wrench.

Now all this work represents the cutting-off machine, the drilling lathe, the turning lathe, the screw-cutting lathe, the planer, or the milling machine. And, unlike many combination tools, the lathe can be made to do all this work well.

With a cheap attachment the lathe can be made to cut gears, making the teeth with practical accuracy, and the lathe itself can be used to produce the index plate that insures this accuracy. A job of planing—or surfacing—where the work will swing in the lathe, can frequently be better and quicker done on the lathe chuck than on the planer platen. The rapidity is much greater because the surface to be worked is continually under the action of the tool, instead of having more than one-third of the time wasted in the running back of the platen for the return chip.

In short, all the other machine tools, either of a rotary or reciprocating character, are simply modifications of the lathe; and with the lathe and its convenient appliances and necessary tools, the mechanic can by the exercise of his taste and skill perform almost any ordinary job in the working of metals possible on machine tools. The possession of a screw-cutting lathe, rest foot lathe and a common bench vice, with their accompanying hand tools, is an excellent outfit for the amateur.

## Set Screws in Heavy Machinery.

A correspondent of the *American Machinist* offers the following suggestions in connection with the recent discussion at the meeting of the American Society of Mechanical Engineers:

One is that the thread for the set screw can often be most usefully obtained on the casting, or similar heavy part, by sinking a loose nut into it in a carefully cored pocket or recess. Thus a full thread can be obtained (rare in cast iron when tapped out of the solid) for the set screw, and if at any time it stretches, or becomes loosened in any other way, it can be wholly renewed at the trifling expense of a new nut.

A second is that for some few cases it will pay to sink a nut or threaded hushing into the casting, to be screwed in dead solid. Into this the tap hole, if that is what is meant by "set screw," can be tapped with the usual slightly loose fit in the thread.

A third is that, when it can possibly be used and tolerated, a standing bolt or stud is far preferable to any tap hole, especially when it must be cored in cast iron. In rolling-mill machinery, in which the vibrations are often extreme, and many bolts are liable to be broken, it is a well-approved practice to use standing bolts, in which the part tapped into the solid iron is  $\frac{1}{4}$  or  $\frac{1}{2}$  larger than the upper or outer end, which receives the nut. Between the two ends the body of the bolt is made square, so that if, by some heavy blow, the outer, weaker end is broken off, the root or inner end of the bolt can be hacked out of the hole, leaving the thread almost invariably in perfect condition. Neither of these devices is new, but each is thoroughly good in its place.

**HEAVIER ROLLING STOCK.**—The Altoona shops of the Pennsylvania railroad are now constructing gondola cars of 60,000 tons capacity. Fifty cars daily is the output already attained. The greatest change over the old style of cars is in the trucks. They will be lowered several inches and each be supplied with three sets of wheels. The managers of the road are confident that by means of this massive rolling stock the car famine will soon be a thing of the past. As a natural sequence to the heavy movements thus created, more powerful engines will have to be employed. The entire locomotive department of the Altoona shops is now employed in constructing engines whose weight is 136,000 pounds, and they have the largest boiler surface of any engine built in the world. Every day sees a

new one turned out of the Altoona shops. These immense machines are exceeded in weight by a few special engines on mountain roads, the heaviest being the "decapod" engines of the Northern Pacific, in use over the Stampede Pass, the total weight of which on drivers and truck is 143,000 pounds, while the entire weight of locomotive and tender in working order is no less than 228,000 pounds, or over 114 tons.

## Self-Culture for Engineers.

The season of long evenings, which, fresh from the enervating effect of the hot weather, affords ample opportunities for reading and study. Upon the use which is made of these evenings depends, in a great measure, a man's progress or retrogression in his business. If the opportunities afforded are utilized in acquiring knowledge which will be of use to him in his business, will enable him to handle his work more intelligently, to undertake new and higher branches and to assume new responsibilities, he cannot help becoming more efficient and valuable. It may not lead to an immediate rise in salary in the spring; he may not find an immediate opportunity of applying all he knows; he may even become a better man than is required in the position which he occupies, but this is all to his advantage.

One of the branches in which the engineer must be proficient is mathematics. The intelligent engineer will find a constant use for his slates and pencil, and after he has mastered the simple branches of arithmetic, integral and fractional, and obtained a proper understanding of proportions, percentages, square and cube root, we should by all means advise him to continue his investigation into algebra. There has been a great deal of contumely heaped upon the "x y z business" by those who could not solve an equation if their situation depended upon it, but it is nevertheless a fact that an easily acquired knowledge of simple algebra will open up to its possessor a wealth of engineering and mechanical literature, will assist him in organizing his thoughts in reasoning upon a problem, save him lots of useless figuring and prove a valuable mental training.—*Exchange*.

**INSTANTANEOUS GENERATION OF STEAM.**—Many devices have been put forth for the instantaneous generation of steam; but as yet no one has been proven to be practical. The accomplishment of such a work would be a most desirable and valuable result. Hence a considerable degree of interest is naturally felt in any effort in this direction. The latest announcement is one which has been patented under English laws by John Blum, LL. D. It is of exceedingly rare occurrence for a patent to be issued in England for a process as distinguished from an invention; such a thing has not happened before, it is said, since the time of James Watt. This fact adds interest to this latest invention. If it should prove practical it will revolutionize every industry in which steam plays any considerable part. It is claimed for it that it will save 53 per cent of fuel, 96 per cent in boiler space and 66 per cent in the cost of plant. Moreover, by its use a boiler explosion becomes an impossibility.

**OIL FOR STEAM MAKING.**—The *American Machinist* says that it has, during the past six years, endeavored to show that the use of crude oil for steam-making could not compete with coal economically, except in rare cases, unless prices were changed materially. It has always, so far, been an elementary question in arithmetic, about which there ought to have been no trouble. If so, how is it that Russian engineers have for years been running steamboats and locomotives by the use of nothing but crude coal oil for fuel? There is but little, if any, difference in the price of coal on the Black sea.

**A BIG PATENT.**—British patent, No. 11,990, which has recently been issued for "Golding's Improved Mechanism for the Conversion, Modification, etc., of Motion," is one of the most voluminous documents of the kind ever issued from a patent office. The provisional and regular specifications and claims of this patent consist of 139 pages, with 72 sheets of drawings!

**STEAM AND EXHAUST PIPES.**—It is recommended that all pipes, steam, exhaust and discharge, be made as straight as possible, but all of ample area. Keep the steam-end well oiled. The exhaust should have an area double the steam-pipe. The pump should be firmly secured on a rock of masonry foundation, and in all cases be easily accessible for use.

**MACHINERY MANUFACTURERS** in this country are recognized as an intelligent part of the citizenship of the country; similarly, mechanics working at the trade connected with building machinery are recognized as men of high intelligence. Put this and that together, and there is reason for the almost entire absence of serious labor troubles in this industry.

**A RAPID RUNNING LOCOMOTIVE.**—An exchange states that a locomotive belonging to the Lehigh railway, on which Prof. Kline is making experiments, attained, during a recent trial, a speed of 82½ miles per hour.

**A NEW INCORUSTATION PREVENTIVE** and boiler-cleaner compound consists of one-half pound tannin, one pound terra japonica, one gallon West Virginia oil, and 90 pounds of soda ash. It is patented.

## SCIENTIFIC PROGRESS.

## About Diamonds.

Some one has been at the trouble to estimate the weight of the diamonds which have been excavated from the African diamond fields in the last few years to the estimated value of \$200,000,000, and have made it out to be 6½ tons. Diamond cutting, until lately, was done almost exclusively in Amsterdam, but recently the English cutters have beaten the Dutch, in some notable prizes instances. It is said that here in the United States cut diamonds are taken up at the yearly rate of \$15,000,000.

## The Matrix of Diamonds.

Professor H. Carvill Lewis, from an investigation of various diamond-bearing strata, comes to the conclusion that the mother rock or matrix of this gem is serpentine in the form of a decomposed eruptive peridotite. Thus, in Borneo, rivers which drain a supreme district supply diamonds and platinum. In New South Wales, where serpentine occurs, diamonds are also found. So is platinum. In the Urals, diamonds and serpentine appear to go together. North Carolina is distinguished for its serpentine, and diamonds have been found there. South Carolina, where diamonds and platinum are found, shows outcrops of post-carboniferous eruptive serpentine. At all these localities chromic and titaniferous iron occur in the diamond-bearing sand, and these minerals are constituents of serpentine.

## Diamonds in Meteoric Stones.

In a Russian paper appears a preliminary report of the examination by Latschnef and Jeroeff, professors of mineralogy and chemistry, respectively, of a meteoric stone weighing four pounds, which fell in the district of Krasnoslobodsk, government of Penza, Russia, on Sept. 4, 1886. In the insoluble residuum, small corpuscles showing traces of polarization were observed; they are harder than corundum, and have density and other characteristics of the diamond. The corpuscles are said to amount to one per cent of the meteoric stone. Carbon in its amorphous graphitic form has been long known as a constituent of meteoric irons and stones; lately, small but well-defined crystals of graphitic carbon, having forms often presented by the diamond, were described in our columns as having been found in a meteoric iron from Western Australia. "If this supplementary discovery be confirmed," says *Nature*, "we may at last be placed on the track of the artificial production of precious stones."

## Scientific Methods.

Scientific methods bear the same relation to intellectual progress that tools, instruments, machines, mechanical contrivances of all sorts, bear to material progress. They are intellectual contrivances—indirect ways of accomplishing results far too hard for bare-handed, unaided intellectual strength. As the civilized man has little or no advantage over the savage in bare-handed strength of muscle, and the enormous superiority of the latter in accomplishing material results is due wholly to the use of mechanical contrivances or machines, even so, in the higher sphere of intellect, the scientist makes no pretension to the possession of greater unaided intellectual strength than belongs to the uncultured man, or even perhaps to the savage. The amazing intellectual results achieved by science are due wholly to the use of intellectual contrivances or scientific methods. As in the lower sphere of material progress the greatest benefactors of the race are the inventors or perfectors of new mechanical contrivances or machines, so also in the higher sphere of the intellectual progress the greatest benefactors of the race are the inventors or perfectors of new intellectual contrivances or methods of research.

To illustrate the power of methods and the necessity of their use, take the case of the method of notation, so characteristic of mathematics, and take it even in its simplest and most familiar form: Nine numeral figures, having each a value of its own, and another dependent upon its position; a few letters  $a$  and  $b$ , and  $x$  and  $y$ , connected by symbols  $+$  and  $=$ ; that is all. And yet, by the use of this simple contrivance, the dullest schoolboy accomplishes intellectual results which would defy the utmost efforts of the unaided strength of the greatest genius. And this is only the simplest tool form of this method. Think of the results accomplished by the use of the more complex machinery of the higher mathematics!

Take next the method of experiment so characteristic of physics and chemistry. The phenomena of the external world are far too complex and far too much affected by disturbing forces and modifying conditions to be understood at once by bare, unaided intellectual insight. They must first be simplified. The physicist, therefore, contrives artificial phenomena under ideal conditions. He removes one complicating condition after another, one disturbing cause and then another, watching meanwhile the result, until finally the necessary condition and the true cause are discovered. On this method rests the whole fabric of the physical and chemical sciences.—*Popular Science Monthly*.

**CALIFORNIA OBSERVATORIES.**—There are in California 12 private astronomical observatories

where work is constantly being done and whose owners take a deep and intelligent interest in the study of the heavens. The history of astronomical science shows that many of the most important and useful discoveries have been made by private observers, using their own instruments and working entirely unaided by public or private beneficence. So well is this recognized that every modern writer on the history of astronomical discovery acknowledges the obligations of the great observatories to the small ones, and of regular astronomers to the volunteers.

**THE ORGANIC CIRCLE.**—The idea of indestructibility and ceaseless change of matter leads to curious reflections. Sir Henry Thompson has remarked that when an animal body decomposes, whether the process occupies four hours, four months, four years, or even 4000 years—any one of these periods being quite possible—those elements which assume the gaseous form mingle at once with the atmosphere, and are taken up from it without delay by the ever-open mouths of vegetable life. By a thousand pores in every leaf the carbonic acid which renders the atmosphere unfit for animal life is absorbed, the carbon being separated and assimilated to form the vegetable fiber, which, as wood, makes and furnishes our houses and ships, is burned for our warmth, or is stored up under pressure for coal. "All this carbon has played its part, and many parts, in its time, as animal existences from monad up to man. Our mahogany of to-day has been many negroes in its turn and before the African existed was integral portions of many a generation of extinct species. And when the table, which has borne so well some 20,000 dinners, shall be broken up from pure debility and consigned to the fire, thence it will issue into the atmosphere once more as carbonic acid, again to be devoured by the nearest troop of hungry vegetables—green peas or cabbages in a London market-garden, say—to be daintily served on the table which now stands in that other table's place, and where they will speedily go to the making of 'lords of creation.' And so on, again and again, as long as the world lasts."

**SEALS WITH BALLAST.**—The seals are carnivorous mammals, divided into two classes—the Pinnipeds, or common seals, with rudimentary ears, and the Otariidae (sea lions, bears, elephants), which have the ears developed. In a late paper before some British naturalists, Dr. A. J. Harrison stated that the Otariidae, which inhabit the waters of the southern hemisphere, are supposed by the fishermen to have an intercal pouch in which rounded stones are carried to enable the animal to sink below the sea's surface when fat. Observations have shown, however, that the so-called "ballast-bag" is only the stomach. To account for the presence of the stones in this organ, it has been suggested that they are intended to aid in the trituration of food, while other persons believe that they have been accidentally introduced with the food, or in play. Similar rounded stones have been found in seals and sea-lions which have been confined in London, and the stomach of a Newfoundland seal which died at Clifton in 1886 contained gravel, nuts and pieces of sticks.

**SCIENTIFIC VISITORS.**—The first instance of the holding of a regular meeting of an English scientific society in this country will occur next fall, when the Council of the Iron and Steel Institute of England will meet here, probably in December. They come upon the invitation of the American Iron and Steel manufacturers. Two hundred and fifty members, including some of the most prominent manufacturers and scientists of England, Germany, Westphalia, Sweden, Italy, and Spain, have promised to attend the meeting. A large number of English scientists were present at the last meeting of the American Society as visitors; but the meeting above referred to will be the first instance of a regular meeting in this country of any foreign scientific society.

**A NEW DISINFECTANT FROM COAL OIL.**—We read in *Le Monde Pharmaceutique* that a new disinfectant of great energy has been introduced in Paris. It is a brown liquid of airy consistency. Water is turned milky by a small addition, and the odor imparted is not disagreeable. An examination of the product justifies the supposition that it is a peculiar saponification of coal oil by caustic soda. It is especially adapted for disinfecting localities where epidemics rage. It cures skin diseases in animals, and gives luster to the hair. It destroys moss and fungus on trees and plants. By sponging a horse with a solution (100 grams in 10 liters of water), flies are kept off.

**ANTIQUITY OF THE SPINDLE.**—In the hieroglyphics over persons employed with the spindle on the Egyptian monuments it is remarkable that the word *sakt*, which in Coptic signifies to twist, constantly occurs. The spindles were generally of wood, and in order to increase their impetus in turning, the circular head was occasionally of gypsum or composition. Some, however, were of a light plaited work, made of rushes or palm leaves, stained of various colors, and furnished with a loop of the same materials, for securing the twine after it was wound. Sir Gardner Wilkinson found one of these spindles at Thebes, with some of the linen thread on it, and it is now in the museum at Berlin, Germany.



## USEFUL INFORMATION.

## Hemlock Lumber.

A recent exchange contains the following on hemlock lumber, which will be of general interest:

Scarcely any of the woods that promise a greater or less competition with pine are making more rapid progress than hemlock. There is every reason to look for a larger production of hemlock from the Michigan mills this year than was ever made before, and for its introduction on its merits into consuming districts where but recently it was pine or nothing. This wood, as it spreads out south and east from Michigan and other distributing points, will find itself met by hemlock from Pennsylvania, and finds itself also in presence of no mean competition. For some time back, in Central and Southern Ohio, the hemlock from the forests of Western Pennsylvania has been coming alongside of the pine from the lake markets and from Central Michigan, and in many cases beating its rival in a fair fight. Hemlock has the advantage of comparative cheapness, and that is, of course, a telling one. The difference of a couple of dollars or so a thousand usually turns the scale in its favor, and in consequence its use is growing wherever it has come into the market for sale upon its merits.

Hemlock makes a reasonably light, strong and durable timber, and there is no reasonable objection to its free use in building. As it is bound to come more and more into market, as the stock of pine diminishes and its cost advances, it is proper the trades should understand that it is not a timber to be despised by any one. It is to a great extent the bill-stuff of the future, though it seems its usefulness is not to be limited to so narrow a field as that and similar purposes. It proves a very successful material for shingles. Pennsylvania makers are turning out hemlock shingles with a 15-year guarantee behind them, and what is more, they are laying them down alongside of pine shingles at prices which the latter can hardly match. It is said that the timber which the manufacturers in the Keystone State are now cutting is much better than much of that which they have sent to market in times past. As they are compelled to go further back from the streams, and gather in the trees standing higher up in the mountains, they obtain a better quality of timber, freer from shake, and showing a finer and closer texture. It appears to be well liked by consumers, who buy the shingles freely under a warrant which they cannot get with any pine shingles they are offered, and which they know would be practically worthless if it were made. Within the past year the development of the Western trade in Pennsylvania hemlock has been very marked, and the indications are that its rise is but just begun.

**MECHANICAL APPLIANCES FOR RAPID NEWS-PAPER WORK.**—There is no branch of industry for which invention has done more during the past 50 years than in the line of newspaper work. True, but little has been done in the way of a more rapid setting of type; but in the press work, which is really the essential part of the mechanical work upon newspapers, most amazing wonders have been accomplished. It is within the recollection of the writer when 1500 impressions per hour were the best that could be done with the most approved printing machines in existence. Now, as we are told, the New York *Telegram* has just put in a press which is capable of turning out "75,000 *Telegrams*" per hour, or 144,000 sheets in the same time." In the construction of this press over 11,000 separate pieces are employed. Three separate plates rest upon its cylinder, and type or stereotype plates can be used indiscriminately. The New York *Tribune* has just put into its press-room three presses worth \$40,000 each, having an aggregate value of \$120,000, and an aggregate capacity of 72,000 copies an hour output. This will enable the *Tribune* not only to run off its daily edition in two hours and its weekly in about three, but also to fold the supplement sheets into the main sheets by machinery, and, in the daily edition, at least, to paste the two sheets together.

**AN IMMENSE FLOUR MILL IN MANITOBA.**—Work is now in progress on a mammoth flour-mill at Keewatin mills, says the *Manitoba Free Press*. The site selected is immediately in the rear of the railway station, and the magnificent water-power at that point will be utilized. The mill will have a capacity of 1000 barrels per day. Adjoining the mill will be erected an elevator with a capacity of half a million bushels. The enterprise is in the hands of wealthy Eastern capitalists. In addition to the elevator to be erected at Keewatin, it is the intention to build elevators and storehouses at all the principal wheat markets in Manitoba. This will be the largest mill in the Northwest Territories, as Ogilvie's mill in Winnipeg, which at present occupies that position, has a capacity of 800 barrels a day.

**A THOUGHT FOR INVENTORS.**—Some one has asked, "Will a mechanical animal ever be invented?" That is, will a machine be so constructed that it will take the mechanical energy in food and change it to motive-power? A horse, for instance, is a machine. The feed of oats that is given him in the morning is converted, by the stomach, into

mechanical energy. A part of this energy must be used in building up his body or repairing waste tissue. Now, if a machine can be constructed which will take the feed of oats and by some chemical process, similar to the action of the stomach, generate available power, there would be a great saving of energy, as all of it could be utilized, none being necessary for the construction of the machine or its repairs. There is a wonderful power stored away in a little food. A man will take, in the morning, a small piece of beef and a couple of potatoes, a slice of bread and a cup of coffee, and from these his stomach will get power enough to carry his 200 pound body around all day, besides feeding the brain and keeping a proper reserve. Science has not yet been able to find a generator of power equal to the stomach, but perhaps it will. Who can dispute it?

**TO SILVER SILK RIBBONS.**—Make a solution of nitrate of silver, and add a little gum to it, so that the liquid will not run. Then, with a camel's-hair pencil or a quill pen, draw any sort of ornamental figure on the silk. After the drawing is dry, hold the ribbon over a vessel containing water, zinc and a little sulphuric acid. In a short time the silver will be reduced and adhere quite strongly to the fabric.

**A NEW BUTTONHOLE ATTACHMENT.**—The announcement comes from Boston that a buttonhole attachment for sewing machines has at last been perfected and will soon be put upon the market. It is described as a marvel of mechanism, every part in it having direct and well-defined movements, regulated by set screws at will, to produce buttonholes of any size or form required.

**A LARGE SPAR.**—A piece of timber was recently made into a spar at Seattle, W. T., which was 86 feet long and 30 inches in diameter at the deck, or 20 feet from the base, while at the small end the diameter was 27 inches, and there was not a knot or blemish to be seen. It contained 5504 feet, and cost \$15 a thousand at camp. As a spar it will cost \$175.

**RENEWING TIMBER LAND.**—Some of the older States are renewing their growth of timber, thus tending to allay the fears of an eventual exhaustion of the timber supply. In New England there is a vigorous second growth of white pine, where the forests are already yielding between 200,000,000 and 300,000,000 feet of timber annually.

**WHEAT IN BRAZIL.**—The cultivation of wheat in Brazil on an extensive scale is a question now occupying the attention of the agriculturists in that empire.

## GOOD HEALTH.

## Causes of Sudden Deaths.

One source of sudden deaths is accidents, but many events pass under the head of accidents which might have been foreseen and guarded against. Americans, particularly, are apt to take great risks—for example, in their eating, their clothing, their building, in crossing railroad tracks and in many other ways. No staging need ever fall, and it would not if proper care were taken in the choice of material and in construction. Think of the frightful list of deaths resulting from the use of oil poured on a lighted fire to cause it to kindle more quickly!

With many other causes of sudden death, our own personal ills seem at first sight to have almost nothing to do. There may be a fatal break in the physical machinery at a point where weakness has not been suspected. The heart, perhaps, becomes unnaturally enlarged, or its tough, muscular fiber turns to fat, and suddenly there is a mortal rupture; or the enfeebled heart fails to send blood to the brain, and the man drops dead in the street or at his business, or, more fortunately perhaps, in the midst of his family.

In other cases there may be a degeneration of the cerebral artery, and high living, or a glass of wine or an excitement of passion, may arouse the heart to send the blood to the brain with a force too great for the weakened arterial walls to withstand. These walls give way at one or more points, the outpoured blood presses against the nerve centers, and thus is cut off the necessary supply of nerve force to vital organs. The man falls unconscious and within a few days dies.

We have not space, says a cotemporary, to speak of other causes somewhat similar, but in most of them the weakness of the link at which the chain breaks is due to overexertion, to too continuous brain work, to excesses in eating and drinking, to passion, to worry. The weak spot being ascertained, the fatal result may be prevented for years, perhaps indefinitely, by a carefully regulated life.

**WINDOW CURTAINS.**—Eminent oculists inform us that in the majority of cases in which the eye-sight has been impaired, it has been caused by facing the light when at work. When we wish to read we sit down in front of the window. We place the sewing machine where it fronts the light. We push the writing-table into the full glare of noontide. All these habits work great evil to the eyes. No part of the human organism is more delicately formed or more sensitive to physical abuse than the

eye; and we are careless of its welfare as though ill treatment could not affect it. A little thought would prevent much mischief. The arrangement of window drapery should have reference to a few hygienic rules that would promote the health of the eye. A side light is the best to work in, and if a strong light is necessary, it should come from the upper half of the window. We are glad to notice the beginning of a reform in lighting our own rooms. Fashion seems inclined to aid us by approving a style that is healthful for the eye. Now, the lower half of the window may be curtained, leaving the upper half uncovered, in libraries, sewing-rooms, and in all the apartments of the house where most of the work is done. This is as it should be, sensible and hygienic. In all our houses we can adopt this style, so simple and inexpensive, and thus help to preserve in its vigor a sense so useful to us as the sense of sight. If the eyes are properly cared for during the growing period, and afterward, who knows how far the years of failing sight may be pushed into the future?

**PHTHISIS AND THE HOUSE FLY.**—The mosquito's share in the economy of nature, says the *Medical Record*, has always remained a mystery, except that it seems to bring out an interesting cutaneous eruption and reduce the price of board in certain districts of New Jersey. The house fly, however, has been credited with some general usefulness as a scavenger. This important function, if it really exists, is offset by the facts now accumulating which show that the fly is at times a carrier of contagion. M. M. Spillman and Hansbater, in particular, have recently shown at the Academy des Sciences the important role which the house-fly may play in the dissemination of tuberculosis. The intestines of flies that have fed on phthisical sputum, and the excreta of these insects, are found to contain the bacilli of tuberculosis. Flies that have fed on such infected matter may deposit the bacilli on windows, tables, food, and indeed may spread potential infection everywhere throughout an apartment. When the fly dies its body desiccates, setting the bacilli free and still capable of growth. The house-fly has thus an immortal part in the shape of pernicious microbes. The idea that this insect may carry contagion is not a new one. The contagious ophthalmia of Egypt is believed to have been spread largely through the flies. Bacteriologists have noticed how readily cultures may become infected by flies, and Koch admits that these insects may be the vehicles for the distribution of cholera. Yellow fever has been spread, it is thought, by mosquitoes, and perhaps also by flies. Facts are accumulating to show that the fly may be not only an annoying but a dangerous factor in a household.

**OATMEAL AS A FOOD.**—Oatmeal as an article of food is fast becoming popular with the English-speaking races, as rice is with the Orientals. It is deservedly popular because it contains nearly all the elements that make perfect nourishment for the physical nature. It has 65 per cent of starch, 20 per cent of the nitrogenous principles, and some sugar, gum and oil. But little more is needed for developing a healthy body, and, as an example of its use, we have the yeomanry of Scotland, with whom oatmeal is almost exclusively the article of diet. As a result, we find a people possessing all the characteristics of perfect health and vigor of body and mind. The firm, well-rounded muscle, the clear complexion, the silky glossiness of the hair, are more the result of their oatmeal diet than of any other one thing. Years ago, when Dr. Johnson first published his dictionary, he defined oats as a grain, which in England was fed to horses, in Scotland to men. An old Scotchman pithily remarked: "And where else do you find such horses, and where else do you find such men?"

**BOVINE VIRUS,** or that taken directly from the cow, is undoubtedly the best that can be used as a preventive from smallpox, where proper precautions and arrangements are made for obtaining it, and where it can be obtained fresh and pure. Such virus is always reliable and is to be recommended. But there is strong reason to believe, and such is the opinion of the highest authorities on this subject, that humanized virus, obtained from the arm of a healthy child, loses none of its protective efficacy, even when propagated through generations.

**DANGER OF BOXING THE EARS.**—*Science* publishes some valuable records, collected by Dr. Samuel Sexton, on the effects of boxing the ears. In 51 cases upon his records the ear has been injured by blows of the open hands or fist. One had inflammation of the ear, and the other had the running of the ear for 12 years. This patient died of brain disease. In another the patient was elated by his father on the left ear, and deafness ensued, with a bloody discharge, from which he was three months in recovering.

**LONGEVITY.**—The three most remarkable cases of long life are those of Thomas Parr, Henry Jenkins, a Yorkshireman, and the Countess of Desmond. Parr lived to be 152 years old; Jenkins is said to have reached 169 years, though the case is not so well authenticated. The Countess of Desmond reached 142 years. It would appear from the recent reports of individual cases that the present was about to become a special era of longevity.

## ENGINEERING NOTES.

## The Two Great Canals.

Almost simultaneously with the failure of De Lesseps' latest lottery scheme for raising the money to complete his Panama canal, comes the announcement of the departure of a corps of engineers from New York for Nicaragua, charged with instructions looking to the actual inauguration of work upon the much-talked-of canal across the isthmus of that name, under the joint patronage of the Governments of the United States and Nicaragua.

The Nicaragua route for a ship canal has always been regarded with especial favor by our government engineers, and in many respects presents decided advantages over other routes that have been proposed. It is much further north than Panama, a fact which means a saving of several days with vessels bound to and from more northerly ports; the climate is excellent; comparatively little rock or earth excavation will be required, from the fact that the great lake of Nicaragua and the San Juan river furnish a natural water-way for about three-fourths of the route; it is believed that excellent harbor facilities can be formed at both termini; and the cost of construction will be very much less than that of any other. These are advantages which are not possessed by any other route. Although this canal will be largely incommoded by quite a series of locks, its other advantages will more than counterbalance the Panama scheme, itself incumbered with the now definite certainty of several locks. Should both be constructed, the Nicaragua canal will, undoubtedly, receive the lion's share of the traffic between the two great oceans.

De Lesseps has shown himself to be a most indefatigable man. He still insists that he is going to complete the Panama canal. He admits that there has been miscalculation, and even a waste of money and materials; but he still has, or affects to have, the most unbounded confidence in the future, and to be sure of ultimate success.

His latest scheme, that of issuing lottery bonds in aid of the finances of the canal company, was opposed in the French Parliament and failed of passage, but he is still confident, and says that his backbone consists in the savings of France. He recalls his speech once made to the Emperor of Germany, in which he said that he found his capital in the woolen stockings of France, meaning, as he explains to the Emperor, the stockings in which the peasants, workmen and small tradesmen store their savings—a few sou every Saturday night.

The *British Trade Journal* thinks that the canal will be ultimately finished, but possibly by American capital. That journal says: "M. De Lesseps and his shareholders are in a terribly awkward plight. They cannot very well abandon works which have cost over fifty millions of money, and yet they cannot with prudence go forward. They have two alternatives, and only two, before them. One of them is to sell the whole thing for say twenty millions to the Americans—who are quite willing to buy the concern—and the other is to suspend M. De Lesseps and to put in somebody who will personally superintend the works."

It will be a difficult thing to shelve De Lesseps—about as difficult a task as to complete the work itself. The old man is very cunning in keeping himself constantly before the French people, assuming that bourgeois air and style which so captivate them. He is frequently seen in Paris with some seven or eight of his eleven children, mounted on their ponies, he himself presenting the very ideal of the man of family and the model of the domestic virtues, and the French people say to themselves: "How can such a man as that, so good and affectionate a father, and moreover, the man who constructed the Suez canal, help succeeding at Panama?" and forthwith they dive down again to the bottom of the woolen stockings and produce some more of their hard earned sous for good old Papa De Lesseps.

Moreover, there may come a time when the small holders of stock may be so numerous and so politically effective as to compel the French Government to come to De Lesseps' aid and to nationalize the Panama canal enterprise. If a canal party should come into power in France the amount would not deter it from assuming the completion of the canal, especially if glory and the honor of the French nation became mixed up in the affair.

It is not impossible that France may take it up as an affair of State, though it is to be hoped that she will not, as it would surely lead to grave international complications. But, whatever may be said, the enterprise is going to be carried out some day. All the financial troubles which now beset M. De Lesseps will be overcome in one way or other, and the canal will be opened for business, though not at the time set by its builders, nor for the money they estimated, nor on the plans with which they set out. It will be a fixed fact, and will be a European link between the two oceans, a link which cannot be ours except at the cost of a war. It is time that we bestirred ourselves to provide an American link between the same two oceans which could not in any event be closed against our vessels by European cannon.



## MINING SUMMARY.

The following is most condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Alameda.

**COAL.**—San Leandro Reporter, Feb. 4: The Livermore coal mines, which have been lying dormant so many years for want of proper attention, have at last fallen into hands that will insure their development. Mendenhall & Guttman, the enterprising real estate firm of Livermore, have purchased the Jenkin Richards mine and commenced work. There are undoubtedly large deposits of coal in that section, and it will be a profitable commodity, when fuel is so much needed as at present.

## Amador.

**PLYMOUTH.**—Cor. Amador Dispatch, Feb. 4: Our town is very dull in a business point of view, since the mine got on fire, and if report is correct, is likely to be dull for some time, as we hear that the Empire is shut down for some time to come, and the Pacific will be the only paying mine to work. The covering was taken off the Pacific shaft last Saturday, and the miners succeeded in reaching the fire. They found it pretty well smothered out, but were afraid to get too far into the tunnel for fear of the gas. The shaft was closed up again to wait until to-morrow (Thursday), when another attempt will be made to get down and put out the fire. The talk is that pipe and hose will be laid into the tunnel and a stream of water with a good pressure will be directed against the fire, with the hope that it may be extinguished. It is understood that the New London has struck a very rich lead at the lower level of the mine, about 1100 feet from the surface. If so, it will make things lively here next summer. The New Chicago is working right along, and taking out some very good milling ore. Lamb & Wickem have struck a new ledge in the War Eagle that promises to pan out better than any strike heretofore made in this mine. H. P. Gordon is still driving his tunnel on Indian Creek, and expects big things when he taps the ledge.

**VALPARAISO.**—We understand that work will be resumed on the Valparaiso mine next week, and that the owners have concluded to put up a mill on the mine in the spring.

**SUTTER CREEK.**—Cor. Amador Ledger, Feb. 5: The mines are running regularly, with water in abundance. Rock is being extracted from the 400-foot level of the Wildman, and is said to be yielding well. The 10 stamps of the Iowa are in operation with good results. The four men who have leased a portion of the Lincoln, started 20 stamps of the mill last week, and expect to keep them steadily at work for some time. Sinking at the North Star is being prosecuted with all possible speed. George Allen has six men employed in putting a wire fence around 1000 acres that he purchased a year ago from the Vogan estate near Mountain Spring. It will take about a month to complete the job. Knight & Co's foundry has received an order for an eight-foot water-wheel for the Ilex mine; also an automatic valve for the same place. They are also getting out a 17-inch pump for Plumas Eureka mines, and the large hydraulic engine which they have been working on for some time, and which will be ready for shipment in about five weeks. They have also secured the contract to put up hoisting works at Quaker City, Calaveras county, which they expect to have completed in about two weeks.

**HUNT'S GULCH.**—Cor. Amador Ledger, Feb. 5: The one-stamp mill at the Sargent mine is pounding away on some very good rock. The Cleveland mine above Big Bar bridge is the scene of activity. The site has been prepared for the 5-stamp mill, and a contract let for the erection of the same. Men are busy taking water out of the shaft preparatory to hoisting rock. Considerable pay rock is in sight, the richest of which is a kind of ribbon quartz, showing some free gold and galena sulphurets. Some think the company would be justified in the erection of a 10-stamp mill. Col. Robinson, the superintendent, however, is content with five stamps for a starter, and will add more as circumstances warrant. I am told that Ginocchio Bros. have purchased the Huntington roller quartz-mill on the Amador Queen No. 2, and will move it to the Valparaiso, to work the rich ore taken from that claim.

**NEW LONDON.**—Amador Ledger, Feb. 5: We hear that the New London struck the ledge again at 1100 feet, and found rich rock. The New London has always been considered a very favorable location, and since the present parties have come into possession of the mine they have gone right ahead, not prospecting, but developing a mine with a certainty of success, and we have reasons for believing that it won't be long before it will be one of the richest paying mines on the mother lode. The New Chicago Mining and Milling Co. are taking out some good rock. We were shown some pieces of rock from the mine that were literally hung together with gold, and we understand that there is an abundance of rock that will pay \$8 or \$10 per ton. We have just heard that the old Empire mine will be let rest for awhile, and all the work that will be done will be in the Pacific. It will throw a good many men out of employment here if this program is carried out.

**KENNEDY.**—At the Kennedy mine it is the intention to sink shortly. Fifteen or 20 men were discharged this week, whether preparatory to sinking is not known. At the big tunnel at Middle Bar there is but little doing. The men are waiting for payday, which is to come next Monday. At the Amador gold mine operations are confined to one shaft, on account of lack of timbers. The Plymouth Consolidated Mining Co. of California will pay, February 6th, Dividend No. 57, of 40 cents a share, aggregating \$40,000, making \$80,000 paid this year, and \$2,280,000 paid to date.

## Calaveras.

**THE MINES AND MILLS.**—Angels Echo, Feb. 1: Although the recent cold weather has interrupted mining and milling operations in this vicinity for a few days, the mines and mills have all started up again and are at present in full operation. The Nevills mine is running full-handed day and night, and stopping is going on busily on the different levels. The mine never looked better than at present, and the ore now being mined and milled is said to yield excellent returns. The Uica, situated north of the

Nevills and adjoining it, is running in full blast night and day. Stopping is being carried on actively in the old works, and also in the new works. The ore now being mined in the old works is said to be of a good milling grade, but is far surpassed by that mined at present in the new works. The mill is kept in constant motion and the battery plates present a very healthy appearance. The new concentrators recently put in position in the mill will soon be in readiness for operation. The Angels Mining Co. is pushing developments with a vim that betokens ultimate success. Everything on the surface is being put in a condition that will admit of working the mine on an economical and systematic scale. In the meantime, extensive developments are being made in the mine. This mine is, without a doubt, destined to rank among the leading gold-producers of California. McCreight & Co's new mill at Albany Flat is now kept steadily in motion and the ore being crushed is said to be of a high grade. Many persons have heretofore thought that this mine was only what is generally termed a pocket lead, but developments have demonstrated the fact that it is not only a milling lead, but one of immense width and of great value. The members of the Jack Rabbit Mining Co., who have been for some time engaged in running a tunnel through the hill for the purpose of getting water to work the mine which is situated near Monarchville, have completed 800 feet, and there remains 800 feet more to be run. It is rumored that operations will be resumed on the Gold Cliff mine.

**ANGELS.**—Calaveras Prospect, Feb. 3: The mining interests in and around Angels are looming up with flattering prospects for an active season.

**COPPER.**—The copper interests of Calaveras, at Copperopolis and Campo Seco, are not lying dormant. With the rise in that metal and the market demand for it, this county will yet see great enterprise shown in the development of its copper mines.

## El Dorado.

**TAYLOR.**—Georgetown Gazette, Feb. 2: The pump at the Taylor mine has been started up after being stopped a short time. The mill will now be repaired and more extensive work will be commenced. Mr. Chester and two other St. Louis gentlemen were at the mine last week.

**ALPINE.**—The contract for the crosscutting at the Alpine mine has been let and work has been commenced.

## Inyo.

**PANAMINT.**—Inyo Independent, Feb. 4: Panamint is rapidly coming up as a busy and prosperous mining camp. At least 40 men are now at work for the Surprise Mill and Mining Co. Most of these are getting out ore. Already a large amount of ore is on the dumps of the company's mines; this will be delivered at the mill as rapidly as the pack-trains can move it. According to last report from the camp the new mill would now be started up, as everything was in readiness for a start when the reporter left there. There is more ore in sight at Panamint than at any other mining camp within the knowledge of any one in this part of the country.

## Nevada.

**BRUNSWICK.**—Grass Valley Union, Feb. 2: The Brunswick people are just now very busily engaged in putting things in shape. A force of men, under the direction of Mr. Wm. May, are repairing the batteries of the mill and making a general overhaul of the entire mill work, and with favorable weather they will have the work completed so that crushing can be commenced within two weeks. The six-inch pump has been taken out of the shaft and an eight-inch one put in its place. This latter pump, running at the rate of eight strokes per minute, lowered the water to level No. 2 (300-foot level) in a comparatively short time. The late heavy snows and freezing of the water ditches compelled the shutting down of the pumping and hoisting works at the Brunswick, and in consequence the water accumulated in the mine. In conversation with Manager Fletcher and Supt. Tilley, yesterday at the mine, they informed us that the water would be entirely out of the No. 2 level by Friday, when the hoisting of ore would be commenced. An ore bin, having a capacity of 70 tons, has been constructed midway between the mill and hoisting works, and it will not be long before the receptacle is filled with mill rock. The two Duncan concentrators ordered for the mill have not yet arrived, but are expected on any day.

**YOU BET DOINGS.**—Foothill Tidings, Feb. 4: Mr. Goodwin brings us the cheerful news that after sinking an incline to the depth of 200 feet and then drifting a like distance, the South Yuba Co. reached the gravel channel on Thursday. Excellent prospects are obtained, and it is a certainty that the lead can be worked by the drifting process at a profit. This ground is situated between two claims which have been worked out but which were very rich, and it is furthermore known that in the South Yuba's claim the channel makes a sweep. Wherever such occurs, fabulously rich gravel is always found. Mr. Goodwin is positive that within a year from 50 to 75 men will be employed by this company and that You Bet will in a measure experience the prosperity of former years.

**DERBEC MINE SHUT DOWN.**—Grass Valley Union, Feb. 8: The Derbec gravel mine at North Bloomfield has been shut down until a reduction can be effected in the price of wages. It is reported that the mine has yielded \$150,000 the past year, all of which has been paid out for lumber and running expenses, leaving nothing for the stockholders. The directors propose to cut down expenses so that a margin of the profit will be left to the company. Heretofore, miners have been paid \$3 per day. An attempt was made some time ago to reduce wages to \$2.50 per day, but it was unsuccessful. It is thought the suspension of the mine will be but temporary, as there is a hope that a compromise will be arrived at between the company and its employees on the wages question.

## Sierra.

**SHUT DOWN.**—Grass Valley Union, Feb. 5: The Alaska quartz mine at Pike City has shut down owing to a strike of the employees, about 100 in number, on account of overdue wages. Though a mine that has been praised much for its richness, the Alaska is nearly all the time in financial straits.

**MILL RUNNING.**—Mountain Messenger, Feb. 4: The Gold Bluff mill is running night and day, on splendid rock that had accumulated during the cold weather when the water-wheel was ice-bound.

## Tuolumne.

**TUTTLETOWN.**—Union Democrat, Feb. 4: The Long Gulch mine on Mormon creek is looking exceedingly well, and the work of hauling the mill is going forward with dispatch. The Ritchie mill has its mortar blocks in position and mill-house completed. The Rowe & Gill enterprise is doing well, and six stamps are continually in operation. The ore thus far has averaged \$12 per ton in free gold. The sulphurets have not been tested.

**EAGLE CREEK.**—Tuolumne Independent, Jan. 28: Flattering prospects are being obtained from the Eagle mine, on Eagle creek. This mine is owned by Messrs. Tibbitts of Columbia and Clark of San Francisco. Considerable work has been done, and the mine promises to be a permanent and paying proposition. The Hart and Jacobs mine, owned by Messrs. Hart & Fallon, has been sold to the same company that bought the Ham & Birney mine, of which the Hart & Jacobs location is an extension.

## Trinity.

**DEADWOOD QUARTZ.**—Trinity Journal, Feb. 4: Charley Gilzean of Deadwood was in town the first of the week and gave us the following items in regard to recent developments in Deadwood quartz: Gilzean & Barrows, who leased the Little Gem from the Gibson Bros. last fall, are now working on the east end of that mine with good results; they have run in a tunnel on the vein for a distance of about 80 feet and the ore is of the same character as previously taken out, averaging about \$300 to the ton. The ledge in the tunnel is eight inches in width and of good quality. They have about 9 tons on the dump which they will crush in Gibson's cannon-ball mill. On the west end of the same ledge, Weyand & Clement are working on very rich rock; they have run in about 200 feet of drift on the ledge and are taking out as good rock as ever. They have an unusually good thing in quartz, as the ore is high grade and they have quite a body of it. A. D. McDonald and Bert Kellogg recently bought out Jud VanMatre's lease of the Monte Cristo, which he had received from the Brown Bear Co., and, the next day after taking possession, went to work in the old tunnel, and driving ahead, struck a 12-inch ledge of ore of the same quality that has made the Monte Cristo famous in the camp. The last lot of ore taken from this mine and crushed in the stamp-mill belonging to the Brown Bear Co. went over \$200 to the ton, and Mr. Van Matre thinks the new strike equally good.

## NEVADA.

## Washoe District.

**BELCHER.**—Virginia Enterprise, Feb. 4: The 400 level crosscut is now in 38 feet, and the ground shows no change for the week. The 500 south drift has been advanced 29 feet; total distance, 138 feet. The ground in the face is of a favorable character, consisting of clay, quartz and porphyry, with some water. The Suro tunnel drift is out 1180 feet.

**OCCIDENTAL.**—At the end of the south drift on the upper tunnel and at the top of the south winze an east crosscut has been extended 10 feet. At the top of No. 2 upraise south of the north incline winze have drifted south 11 feet. The south drift at the top of No. 2 upraise has been extended 10 feet; total length, 29 feet. Extracted 13 tons of ore. On the 100 level No. 2 upraise in the east drift north of the raise, the north drift has been extended 14 feet; total, 29 feet. On the 200 level at No. 3 upraise have extended the north drift 5 feet; total, 25 feet. In the north incline winze 25 feet above the 200 level have extended the south drift 10 feet; total, 18 feet. The ore extracted on this level is held in the mine.

**HALE AND NORCROSS.**—On the 400 level the north and south drifts have been advanced 20 feet. The south drift continues in low-grade quartz. The north drift shows stringers of good ore. On the 700 level the ore development shows further improvement. The drift north from the top of the north upraise is now advanced 55 feet and continues in excellent ore. We have extended this upraise two square sets higher since last report in high-grade ore—its total height being 108 feet. The south upraise is now 77 feet above the track floor and continues in ore of good quality. We have hoisted and shipped the usual quantity of ore to the Vivian mill and have bullion on hand amounting to about \$32,000.

**CROWN POINT.**—The 500 raise is now up 75 feet. At a distance of 70 feet up the clay wall was cut and then into a very fair grade ore. Contrary to expectations, the wall was found to be pitching 45 degrees east, showing that the ledge changed its dip at or immediately under the 400 level track, and that in order to intercept its downward continuation on the 500 level it will be necessary to crosscut east from the south lateral drift instead of west.

**SAVAGE.**—On the 600 level the south drift has been advanced 25 feet in excellent ore. We are extracting the usual quantity of ore from the several levels between the 400 and 900 stations. On the last-named level the west drift has been advanced 27 feet, and the improvement referred to in the last weekly letter continues. We have bullion on hand amounting to about \$30,000.

**ALPHA, IMPERIAL AND EXCHEQUER.**—On the 382 level of the Alpha shaft the favorable looking ground heretofore mentioned produces spots and streaks of good ore. The general tone and appearance on this level is most encouraging for the development of an ore body and the placing of these properties on a substantial paying basis.

**BEST AND BELCHER.**—On the 425 level west crosscut No. 3, 130 feet south of north line has been advanced 50 feet. The formation is quartz, showing value by assay. Upraise No. 1, started from a point 30 feet north from the south line, has been carried up 25 feet. The raise is passing through quartz showing low value by assay.

**GOULD AND CURRY.**—Are still prospecting on the 250 and 300 levels for ore. Have extracted 50 tons of fair-grade milling ore. On the 1300 level the south drift from the east drift has been extended 42 feet; total length, 233 feet. The formation is porphyry and clay.

**YELLOW JACKET.**—Extracting the usual quantity of ore and shipping the same to the Brunswick mill. There is no definite information of the ore find on the 1100 near the Confidence line, further than that the explorations continue to improve.

**UTAH.**—On the 472 level in the north drift 335

feet from the west crosscut No. 5, east crosscut has been extended 45 feet; total, 93 feet. The formation is porphyry and clay.

**JUSTICE.**—Are upraising to connect the 400 level with the 340 level, and drifting southeast and north. There are nearly 1500 tons of fair-grade ore on the dumps.

**CHOLLAR AND POTOSI.**—Extraction of ore on the several levels and the usual prospecting work going on. The mill runs steadily and most satisfactorily.

**SCORPION.**—On the 300 level the north drift is advanced a total length of 80 feet and the south drift 74 feet. Both are in vein material.

**SEGREGATED BELCHER.**—The south drift from the raise was advanced 20 feet; total length to date, 106 feet.

**ALTA.**—The regular work of extraction of ore and prospecting work is being done.

**WEST CON. VA. AND CAL.**—Sinking the shaft and making good progress.

**BULLION.**—Cutting out a station on the 500 level preparatory to drifting.

**BENTON.**—Drifting on the 725 level, without change to report.

## Eureka District.

**ORE SHIPMENTS.**—Sentinel, Feb. 4: During the past week ore shipments were made from the mines of the district as follows: To the Richmond Reduction Works from the Silver Lick mine, 38 tons; Seventy-six mine, 7 tons. Jackson mine, 22 tons. Eureka Con.—Prospect mountain tunnel, 2 tons; Margu retta mine, 14 tons; Dunderberg mine, 14 tons; Lone Pine mine, 12 tons, and Bowman mine, 12 tons.

## Hawthorne District.

**AN INTERESTING DISTRICT.**—Walker Lake Bulletin, Feb. 1: Nearly all the districts in Esmeralda county are preparing for more than usually active work this year, but some of them will attract an interest equal to that which will be displayed over the developments in Hawthorne district. The discovery of the Lapanta gold was a revelation to miners. So much being found near the surface on that claim incited the most zealous prospecting, but for a long time this prospecting was simply a search for places where money could be picked up from the ground with little more than the labor of stooping. Few such places were found, but, though the Lapanta showed that there was gold deep in the ground, the prospectors reluctantly gave up their search for treasure that did not need mining. However, by degrees miners began to sink on ledges, and, although there were the usual number of disappointments, there were enough developments to indicate the chances of wealth for those who went to work in earnest. For a time the Lapanta was closed, all the ore of high grade having been extracted, but at that time the Pamlico, in a distant section of the district, began to yield the rich rock which has made it famous, and which yield, making the allowances to which gold miners are accustomed, of the time required for passing through occasional bodies of barren or lower grade rock, has been continuous ever since. While the Pamlico was showing what might be expected from deeper workings, the lessees of the Lapanta opened a body of ore better than any previous deposit. This ore body in the deepest workings of the mine is still yielding, and were it now even completely exhausted the mine would be regarded by mining men as more valuable in a speculative sense than ever. Encouraged by the results in these two mines, other men have been doing systematic work and more are preparing to begin. The discoveries in the Narrow-Gauge and Green Isle are but types of what may be expected in any of the claims where real work is done on a reasonably promising surface indication. It is now understood that where one deposit of gold-bearing quartz has been found the probability of others of the same kind existing in the same ledge is almost a certainty, and the total exhaustion of all pay ore in sight will no longer be an inducement to miners to relinquish their exertions. Work will hereafter be steadily prosecuted and the variety of formation and developments in the several sections of the district will be unusually interesting to mining men of study and research, while the pecuniary results will be beneficial to those who stake their time and money against the rocky walls of the chambers where the gold lies hidden.

**HALF MOON BAY.**—Esmeralda News, Feb. 4: This mine is situated about the center of the mineral belt of Hawthorne district. The vein is of uniform thickness; the ore fair grade, carrying gold, silver and lead. On Thursday last Herb, Hartson and Syl. Light, the lessees thereof, shipped, in care of Selby & Co., ten tons of this ore, the product of the labor of two men for one month. The ore will certainly net them \$600. This is another of the many instances where the miner has been well paid for his labor on the mines of Hawthorne district. After attending to the shipment of their ore, Hartson and Light returned to their mine illumined by the Half Moon.

## Marietta District.

**GOOD PROSPECTS.**—Esmeralda News, Feb. 4: The prospect for Marietta mining district is, to say the least, most flattering. Many of the owners of mines there have been laboring assiduously to bring the old camp to the front and their efforts thus far have been commendatory. M. M. Comstock and others have an abundance of ore in sight in many of the different mines, while the dumps are groaning under the numerous sacks of ore waiting shipment. This revival of mining is due exclusively to the encouragement extended by the Candelaria W. W. & M. Co., the owners of the Georgene mill at Candelaria, in the matter of economical reduction of the ores of that district. In nearly all of the mines the click of the hammer and blasting sounds can be heard, while L. Lannoix of Belleville will hereafter be kept busy transporting the ore to Candelaria with his teams.

**ENDOWMENT MINE.**—Frank Higgs, who has been diligently at work on the Endowment mine at Marietta for some months past, has on the dump, as a result of his labor, 200 tons of milling ore of fair grade. Preparatory to having it worked, Mr. Higgs shipped a few sacks of the ore to the Georgene mill, at Candelaria, as a working test, and is so well pleased with the result obtained that he will have his ore shipped there for reduction.

## Rye Patch District.

**FAVORABLE.**—Silver State, Feb. 1: The mining outlook at Rye Patch is very favorable. The Butte Company's mine is looking exceedingly well and



producing rich ore. This mine is being worked by a Reno company, of which W. T. Hales is superintendent, and they ship the ore to the Reno Reduction Works. The Humboldt Queen, of which Mr. Sunderland is superintendent, is yielding large quantities of ore. The ore sheds are now full of ore, and the company will probably erect a mill next spring to work it. The Sunrise mine, near the Humboldt Queen, owned by Marion Howell, is said to have been sold to an English company, which will thoroughly develop it.

#### Tuscarora District.

**BELLE ISLE.**—*Times-Review*, Feb. 3: Fair progress has been made in extending the crosscut east on the 250-level. Rock continues very hard.

**PONDEROSA.**—East crosscut, since last report, has been extended 20 feet.

**NAVAJO QUEEN.**—Ground passed through in shaft this week still looks very favorable.

**FOUND TREASURE.**—Drift, 150-foot level, has been extended 22 feet during the week, and it has connected with the gangway, thus placing the main or new shaft in communication with the old works, and affording an abundance of fresh air throughout this level and the one above.

**NEVADA QUEEN.**—North drift on east vein has been advanced 10 feet; south drift nine. The ore has improved in quality very materially, the whole face being in fine ore with every indication of still improving.

**GRAND PRIZE.**—The stopes are furnishing the usual amount of high-grade milling ore. Owing to the hard quartz nature of the ore, the crushing capacity was very limited, and five more stamps have been fitted up, making 15 now running, and mill is doing good work. Average battery assays for the week, \$206.80 per ton.

**NAVAJO.**—South drift from west crosscut No. 2, east vein, 250-foot level, extended nine feet; total length, 85 feet. The vein is looking more favorable. West crosscut No. 1 from west vein, 150-foot level, was started the past week and extended seven feet.

**NORTH BELLE ISLE.**—Line crosscut, 300-foot level, has been extended 10 feet. No. 3 upraise is up 57 feet. Fair progress has been made in opening the first stope along the vein on this level. North drift from No. 3 crosscut, 70-foot level, extended six feet; total, 42 feet. Ore strata improving in width and grade. The stopes are looking as usual at all points, and the usual amount and different grades of ore is being extracted.

**COMMONWEALTH.**—The main shaft has been sunk and rimbers all into the 300-foot level, and will now be able to push the work of developing and exploring the 100 and 150-foot levels.

#### Wild Rose District.

**PARADISE VALLEY MINING COMPANY.**—*Silver State*, Feb. 7: Ore produced and delivered to the mill, Paradise mine, 71 tons. Average assay value in ounces per ton—silver, 10.21; gold, 0.06. Mill run 186½ hours and lost 5½ hours. Reduced 80 tons of ore and 40 tons of tailings. Produced 420 sacks of concentrates, 28,300 pounds, par value \$24.616, which were shipped to the Selby Smelting and Lead Co., S. F. Cal. The south drift from No. 2 west crosscut, Wild Goose lower level, shows about the same width of quartz as it did last week, but is carrying more metal than heretofore, with small bunches of medium-grade milling ore. The north drift, same mine and level, has improved greatly the last few feet. The face is about five feet wide, with more or less mineral for three feet, and about 15 inches of low-grade milling ore on the east wall. The vein appears to be widening quite rapidly, and the barren rock going out.

#### ARIZONA.

**TERRITORIAL NOTES.**—*Prescott Courier*, Feb. 1: Mr. Dolph of the Oro Fino Hydraulic Co. says they have fully 500 inches of water. As yet, but one pipe is used; the other pipe will be tumbling down grade in a day or two. Plenty of gold can be seen in the riffles. The Lynx creek hydraulic people are piping away. Lots of gold to be seen in riffles. Placer miners are busy in a dozen creeks and many gulches. Many of them are making big wages—from \$4 to \$6 a day to the man; others less. Gold taken out by these people is finding its way to Prescott. John S. Jones, manager for the Standard Milling and Mining Co., has a great many miners and others employed in Groom creek district. Miners have faith in Mr. Jones' ability to work their ores and are anxious for the mill to start. It is one of the best places in the mountains; surrounded by ledges, wood and everything necessary to give success. Mr. Cover, who is working the Tip Top mine under a lease, has several tons of shipping ore out. Chlorides near by are shipping plenty of ore. Col. Bigelow said yesterday that Dan Hatz has located an extension on the mine recently found by Bigelow & Smith, and that said extension was yielding as rich ore as the discovery claim. This ledge should be opened at once as the croppings promise well. Work is all the go in Weaver and Kirkland valley districts. Nevada and Colorado miners who recently went into the districts are so well pleased that they are working day and night. There is not a great deal of ore at the sampler, nor will there be until after roads and trails shall have dried a little. Mr. O. Floyd, who has come in from Turkey creek district, tells us of big strikes in the Scotch Lassie and another mine.

**OLD GLOBE.**—*Silver Belt*, Feb. 1: Upon invitation of Superintendent A. L. Walker, of the Old Dominion Copper Company, we made the circuit of the Old Globe mine on Monday last, our first visit since the resumption of work last month, and were gratified to find that so much had been accomplished in that time. Ore bodies on the second, fourth and fifth levels are looking well, and the ore in places improving in quality. Supt. Walker has had many difficulties to contend with, and it will be some little time yet before matters are running smoothly and to his satisfaction. The most important work recently undertaken is the sinking of a new shaft about 100 yards to the east of and on a level with the ore chute at the mouth of the tunnel. The location is the most eligible that could have been chosen, being much nearer the smelter than the Mooney shaft through which all the ore is now raised, and so situated that a tramway can be easily constructed from the shaft to the smelter, if at any time it is deemed advisable. Work on the shaft will be pushed with

all possible speed, and it is hoped that within five or six months it can be made available for the hoisting of ore. It is to be a double compartment shaft, fitted with two cages.

#### COLORADO.

**SILVER-LEAD.**—*Elk Mountain Pilot*, Feb. 2: As to the number of claims producing silver-lead ores in this vicinity we will say that their names are legion, a few only of which we can mention. Among the most promising showings for a large product is the Daisy mine, situated in Redwell basin, about six miles from Crested Butte, and less than two miles from the terminus of the Rio Grande railroad at the breaker. Recent developments are proving this to be a wonderful ore deposit. An immense ore chute was opened some time ago, which extends in the same course of the vein for a long distance, which is about 35 degrees from a horizontal. The vein rises from the basin and cuts into Redwell mountain to the south. The largest deposit of ore yet encountered lies on the floor or footwall, where is found a solid deposit of galena and sand carbonates of from four to eight feet in thickness and continuous as far as explored. The ore is picked and shoveled out as easily as the contents of a sand bank. The mine is in shape to take out from 10 to 30 or possibly 50 tons per day when the season opens. There are other silver-lead properties in the vicinity that promise shipping ore in the near future, also some just over the mountain that are likely to produce some fine ore the coming season. There are numerous claims located in Bixler basin which are meritorious and if worked will produce ore for shipment, viz.: the Excelsior, Jacob Strader, Gift, Domingo, Big Strike and others.

#### DAKOTA.

**LEACHING WORKS.**—*Black Hills Pioneer*, Feb. 1: The Deadwood Reduction Co. has recently been in receipt of reliable advices that Prof. R. D. Clark will now reach the hills in a very short time. Pending his arrival or receipt of a letter now said to be on the way hither from Cortez, no decided action is proposed toward erection of plants. Conversation with Messrs. Kingsley & Biding of the company, adduced, however, that the arrival will be the signal for the inauguration of active operations, and that leaching works of not less than 40 tons daily capacity and more probably with capacity for reduction of 100 tons of ore per day, will be built at once. All preliminary details have already been arranged, and nothing now remains but to carry the ideas into execution.

**MANITOBA.**—On the Manitoba lode, lying between the Caledonia and the High Lode Extension, and owned by the Manitoba Co., not a little development work, with extremely encouraging results, has already been performed. The claim was originally located in 1879 and relocated by J. C. Jones, in 1885. Since the latter date two shafts have been sunk, one 30 and the other 50 feet deep. A tunnel now 100 feet long, intended to cut the latter shaft, when it has reached a greater depth, has been started. In the bottom of the 50-foot shaft, free milling ore, assaying from \$5 to \$50 per ton, has been found. The proximity of a large ore body is known, and when work is again inaugurated at an early date in the spring, it is probable this property will be developed into one of the best in Whitewood district.

**HOMESTEAK.**—*Deadwood Pioneer*, Feb. 3: The Homestake people are contemplating a change of their method of reducing ores, for the purpose of largely increasing the capacity of the present works. Instead of the system of stamps now used, the company has in view a steam stamp.

**ORO FINO.**—Superintendent Allison brought in from the Oro Fino Thursday a handsome gold brick, the mine's regular monthly contribution to the Black Hills output of the precious metals. Twenty stamps, the mill's full capacity, are constantly dropping on a good grade of ore mined from the 200-foot level.

**ONTARIO.**—Fred, Sebastian and W. A. Delaney came in from Galena Thursday, to perfect arrangements for shipping ten tons of Ontario ore to the Iron Hill Smelter, for reduction. The ore will be transferred thereto next Monday. The lowest assays obtained from a number of samples gave a return of 31 ounces silver and 20 per cent lead, while others ranged from that to 80 ounces silver and 40 per cent lead per ton. The mine, located between the Hester A and Hays, is worked through a tunnel. Results to date have been of a very satisfactory nature.

#### IDAHO.

**FROM ERA.**—*Inter-Idaho*, Feb. 1: Mr. Coates, who is the only person who has got across from Era to Hailey since the big snow, gives a flattering report of the mines there. A very important strike was made on the surface of the St. Louis about the 8th of January, the ore running \$1000 to the ton. It is entirely distinct from the original discovery of the St. Louis, being 200 feet above it and 100 feet above the face of the tunnel. The vein runs north and south. Jim Smiley is the lucky man who found it. He is now taking out an average of \$1000 a day and has 3½ months yet to run on his lease with the privilege of working four men. The strike is in native copper, antimonial silver and sulphurets. The ore carries from 150 to 1600 ounces of silver to the ton; there being an eight-inch vein of antimonial silver which goes 1600 ounces. The gangue, 14 inches in width, which incloses this, yields 1000 ozs. to the ton. The Carrie Bell, owned by the Butler Bros., adjoins the Last Chance. The Carrie Bell tunnel, on which the owners have been driving all winter, is now about 60 feet from the Last Chance vein. The Utah mine is owned by Geo. Richardson, Wiley Jones and W. M. Crawford. Mr. Richardson is taking out some fine milling ore from it, which carries from 60 to 70 per cent of lead and from 60 to 80 ounces of silver. There is also a fine showing of ore on the Astopile, which is 1200 feet west of the St. Louis, on the opposite side of the hill and parallel with it. Ridley Roberts, A. W. Williams and Frank Cochrane are the owners.

**THE FLINT CREEK PROPERTY.**—*Butte Inter-Mountain*, Feb. 2: Supt. Frank M. Freyschlag of the Flint Creek mine is now in the city and reports work progressing steadily in the development of that property. At present they are running a tunnel to crosscut at a great depth the higher two of the veins

running through the company's ground. The lower vein has been opened at four places, covering a distance of about 300 feet along it. They have ore in all the openings—an apparently continuous body, but only from 12 to 20 inches thick. Their deepest incline in this part of the property is about 100 feet. Little attention has as yet been given to taking out ore, but he says they have a considerable quantity in sight and all of good grade.

**VIENNA.**—*Ketchum Appeal*, Feb. 4: Besides the mines owned by the Vienna Co., there are others in the district that deserve favorable mention and which have been more or less developed. Among them are the Solace, Emma, Lion, Elsie and the Nellie group. The Solace, owned by J. B. Haggin and Senator Hearst, was purchased in 1887 for \$30,000, when only an open cut of seven feet in depth had been made upon the ledge. This has been a remarkably rich mine; a considerable amount of work has been done, and there is no doubt but that the ore taken from the mine has paid all expenses thus far. The other mines referred to have had a limited amount of exploration work done upon them, but not enough to ascertain their true character or intrinsic value.

**OPHIR.**—The news received from the Ophir mine at Boulder states that the mine is still improving. An additional force of miners have been put at work during the week. J. F. Welsh and others who have a lease on the Sitting Bull mine at East Fork have recently struck a fine vein of carbonate and galena ore two feet wide. Reports of new finds in the East Fork locality are frequently coming in. The North Star mine is producing 14 tons of first-class ore per day, with only a limited number of men at work in the mine. McPheters' teams are delivering about 30 tons of ore per week from the North Star mine to the smelters.

**RESULT OF THE TRIAL RUN.**—*Coeur d'Alene Record*, Feb. 1: The cleanup of the trial run of 13 tons of Fay Templeton ore was made at the Golden King mill yesterday. The result is a fine gold bar weighing 22 ounces, 6 pennyweights and 5 grains, estimated at the Bank of Murray to be worth \$357, or \$16 per ounce. The result proves that the ore carries \$27 per ton in free gold, instead of only \$2.50 as W. B. Honeyman said after his little scheme to gobble the property was nipped in the bud. Aside from the free gold product, 145 pounds of concentrates were obtained, estimated by Mr. Riley, the amalgamator, to be worth at least \$20, or about \$300 per ton. When Messrs. Human, Krause and Klein left the mill the batteries had not been cleaned and Mr. Riley thought that about \$20 more would be obtained. If that is the case the ore is worth, including the concentrates, \$29 per ton. We are informed by the owners above mentioned that active operations at the mine will now be resumed, and that a milling contract will be made with the King company. They say the next run will be 100 tons. Competent judges estimate the amount of ore now in sight at the mine at 10,000 tons. There is not a property in Coeur d'Alene that can be more economically worked. We congratulate the owners and the miners of Pony gulch who rustled hard for grub while demonstrating their faith by their work. The result of the Templeton test means much for Beaver district and the entire north side. Three cheers for the gold belt and the "California immigrants!"

#### MONTANA.

**STRIKE IN THE GOLD HILL.**—*Inter-Mountain*, Feb. 1: It is reported to-day that the Diedrich Bros. and their partner, who have a lease of the Gold Hill property, back of the county court-house, have made a big strike in the property at a depth of about 160 feet. It will be remembered that a year or more ago some very rich silver ore was taken out of this property at a depth of about 60 feet, the ore being incrustated with silver. The character of the ore has since changed to copper, and they have now cut into a big body of it, the extent of which has not been determined, but they are into it seven or eight feet without having found the other side yet. Assays show the ore to carry between 20 and 25 per cent copper and eight to ten ounces of silver. The boys feel so good over it that they have shut down work for the day, and are properly celebrating the event, which promises to be of such vast importance to them. They have, it is understood, received a handsome offer for their lease, but refuse to sell. The property is owned by N. J. Bielenberg, W. A. Clark, and H. S. Clark.

**NOTES.**—*Butte Miner*, Feb. 4: Active operations have been commenced at the West Colusa. Messrs. Robinson & Co.'s lease on the Big Bonanza mine will expire March 1st, when they will move all their machinery to the Damarack, just north of Meaderville. The Morning Star mine is now turning out large quantities of rich ore. A lot sent to the Pueblo Works yesterday yielded 166 ounces of silver, and \$27 in gold per ton. The small mill of the Alice Co. is kept in constant operation on ore from the Alice mine. The fact that the railroad is being extended to the salt bins at the large mill indicates an early resumption of operations there. Mr. Hornbrook of the Pueblo Works says the receipts of custom ores are growing larger day by day, since the weather moderated. Mines can be worked near the surface now that could not be touched during the severe weather. The new boilers at the Mountain View have been placed in position, and the smokestacks were raised yesterday. A five-inch cable and double deck cages will be used. The air shaft is completed, and drifting commenced yesterday.

#### NEW MEXICO.

**SOCORRO NOTES.**—*Bullion*, Feb. 4: A mill is being erected for the treatment of ore from the Standard, a property in the vicinity of the Lone. The Humming Bird mine at Hermosa is under bond to H. B. Hamilton of Socorro. St. Louis parties are figuring on it. It is reported that John St. Charles with one helper took out \$7500 worth of ore in three days on his recent strike at Hermosa. Work has been revived in the Tierra Blanca district, and some fine-looking ore is being taken out of the different mines. In the Shakespeare district, matters are on the qui vive. A big mill is about to be erected and work on mines will be steadily pushed. The Pride of the West, located between the Iconoclast and Templar mines, has been purchased by Kansas City parties and will be developed. The

machinery for the Thomas concentrator at Kelly has all arrived at last, and will be put up without any further delay. John Baicher, a prominent Lordsburg miner, reports the condition of mining affairs in his district as very flattering. Among other properties in that district are the Fraction, Wynnan Volcano, Martha and John Smith, all of which are doing well. An Eastern company is considering the advisability of purchasing these mines. Chas. Myers had a carload of ore from his mine near Hillsboro treated this week at the Rio Grande Smelter Co. His ore run 4½ ounces gold and 116 ounces of silver to the ton. R. H. Hopper, one of the owners in the Templar and Virginian mines at Kingstons, has received his returns from the carload of Templar ore he had treated this week, by the Rio Grande Smelting Co. The returns gave over 700 ounces of silver to the ton. He says there is plenty more just like it where that came from.

#### OREGON.

**THE MINES.**—*Bedrock Democrat*, Feb. 2: The mining community look forward to the coming season with hopes for great activity in both quartz and placer properties. The winter has been most favorable for placer mining and a good season is assured. The past year noted grand development in quartz mining throughout this entire section, and on several properties mills have been erected. At the beginning of winter a lull in operations occurred on account of not being prepared to prosecute work in the deep snows, but everything is in readiness for the opening of spring, and we may confidently look for more active operations than ever when that time arrives.

**PLENTY TO DO.**—*Jacksonville Times*, Feb. 3: Water is quite plentiful and all of the miners have plenty to do. Logg & McDonnell of Forest creek are running on full time and will do well. The mining population of southern Oregon are quite busy and make the most of their opportunity. John Miller is operating his mines on Farmer's flat, which are rich, on a larger scale than ever. Saltmarsh Bros. of Sterlingville precinct have plenty of the aqueous fluid and will make the most of it. The Sterling Mining Co. has two giants at work and is making the gravel fly. A good season is prospective there. A. W. Sturgis of Forest creek has increased his supply of hydraulic pipe, and will make a better showing than ever. O'Brien & Berryman have started work at their new mines on Applegate and expect to make their first run profitable. The Jacksonville Milling & Mining Co. has suspended operations for the present, but will resume prospecting at an early date. It has expended over \$3000 during the past two years.

**THE CRACKER CREEK MINES.**—*Bedrock Democrat*, Jan. 30: The owners of the Cracker creek mining property, Messrs. Jonathan Bourne, Jr., and C. W. Knowles, are making extensive preparations for the working of the mine the coming spring. Development work has been industriously pushed all winter and the results have been most satisfactory. The mine is proving itself to be a veritable bonanza and there is every probability that the owners will erect an improved milling plant on the property next season. The purchase price of this mine was \$25,000, and to-day the owners would be loth to accept treble that amount for the property; in fact, it is said that they have expressed themselves that \$1,000,000 would not buy it. This is only one of the many properties in this country that are in waiting to fall into the hands of moneyed owners to show up their immense wealth.

#### UTAH.

**PARK NOTES.**—*Record*, Feb. 4: Work on the Fairview group northwest of the Massachusetts and owned by Chambers, Hollister and some Salt Lake bankers, is going ahead with favorable results. The small force of men have worked to good advantage developing this property. The incline shaft is down 200 feet on the vein, carrying ore all the way. Now the main work is being done on the 100-foot level, drifting on the vein east and west in ore. Ore taken from this level goes from 15 to 55 ounces silver to the ton with a small percentage of lead. This property has a true fissure vein and is in a quartzite formation. It looks now as well as the Ontario did at the same depth, and there is no doubt that when enough depth is reached the Fairview will be a good paying mine.

**ANCHOR.**—Work on the Anchor drain tunnel is going ahead as fast as possible through very hard rock. Wednesday afternoon operations were interrupted by the screw on the end of the piston rod of the air compressor which runs the Burleigh drills breaking. The damage was repaired and the next day work was resumed. If all goes well the connection from the tunnel mouth to the intermediate shaft workings will be made by March 1st, making the entire length about 3300 feet, or half the work done, and all since last August. After the connection is made there will be but one face in which to work. Word comes to the *Record* to the effect that a strike was recently made in Morey's Walla Walla tunnel property, just east of the old Parley's Park and the Ontario. The property is well developed, and the efforts of the owners are at last rewarded by a lot of fine-looking ore on the dump.

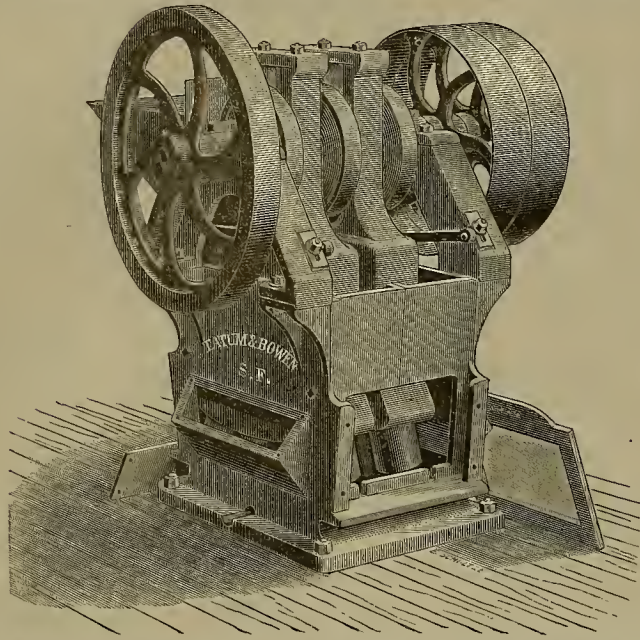
**ORE AND BULLION SHIPMENTS.**—During the week the Crescent shipped 126,100 pounds of first-class ore. Last Tuesday the Ontario shipped 29 bars of bullion containing 15,928.72 fine ounces of silver. On Wednesday, the 1st inst., eight bars of Duly bullion, 9297 fine-silver ounces, were shipped from the Marsac mill.

#### WASHINGTON.

**RETURNED FROM SALMON.**—*Ellensburg Capital*, Feb. 3: On Monday Mr. Brown returned from Salmon bringing three passengers with him. His return trip was uneventful and was made in less than a week. He found but little or no snow along the Columbia, and on this side it was rapidly thawing, making sleighing difficult. He thinks greater effort should be made to keep the roads open, and says they can be kept in good condition all winter. The miners of Salmon are all in good spirits and anticipate a great stampede this spring. They have been isolated this winter and hover about the stage on its arrival eager for letters and newspapers from the outside world.



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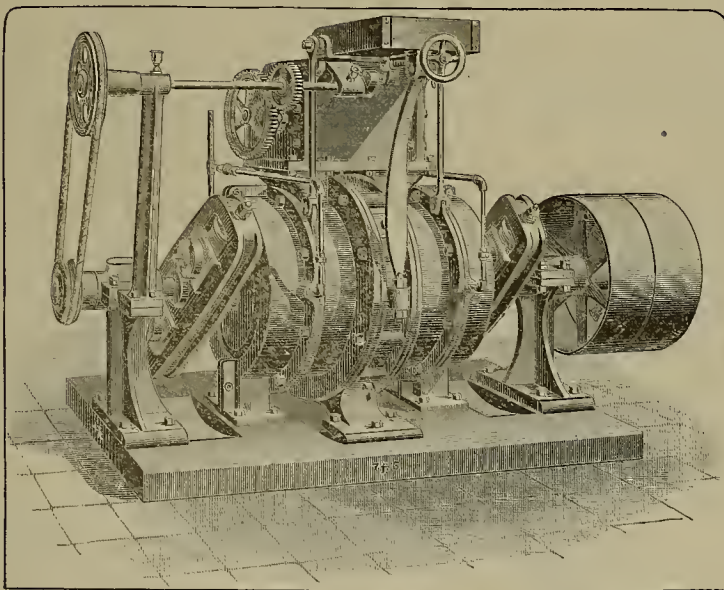
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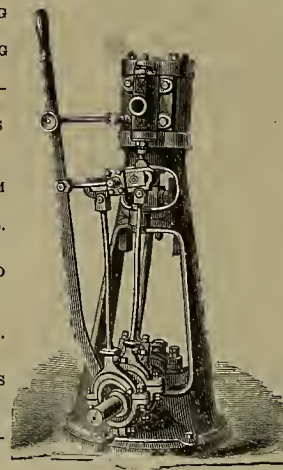
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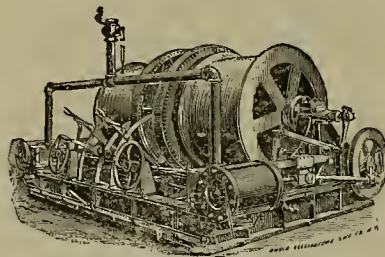
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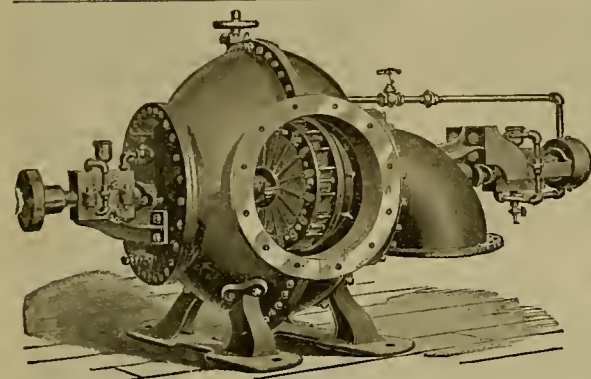
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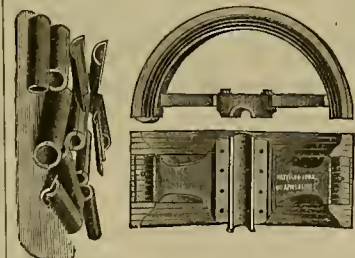
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## Test of Ore-Feeders.

EDITORS PRESS:—There may be something of interest to your readers who are engaged in mining enterprises in the following relation of facts which have been brought to the notice of the writer.

It will be remembered that upon the opening of the exposition of the Mechanics' Institute, held in this city in October last, a Hendy improved Challenge ore-feeder was placed in position, on the front of which was fastened the usual name-plate which had been affixed to 1900 others which had been manufactured and sold and successfully operated. This name-plate bore the following inscription, viz.: "S1000 Challenge ore-feeder, J. Hendy, S. F., patented March 17, 1874." A day or two subsequently there appeared in the machinery department of the exposition a flaunting banner announcing that the Loftus ore-feeder accepted the challenge of \$1000, a feeder hearing that name being placed on exhibition.

Negotiations were entered upon and eventually culminated in each of the patentees of the respective feeders depositing, in a well-known bank of this city, the sum of \$1000, preliminary to the arrangement of a fair and impartial competitive test to determine the comparative merits of the two forms of feeders. Following this, the managers of the Experimental Mining Co., having erected a ten-stamp gold-quartz-mill on their mining property at or near Columbia, Tuolumne county, this State, elected to place therein a Challenge and a Loftus feeder to be operated side by side, under equivalent conditions of use.

The mill being made ready for operation, the superintendent, a perfectly disinterested person, acting in the interest of the company which he represented, being desirous of determining which was the best form of feeder, undertook a competitive trial between the two, which was conducted in a full, strictly fair and impartial manner, and the superiority of the Challenge was so unequivocally demonstrated, and the Loftus found to be so incapable of fulfilling its intended purpose, that he gave a peremptory order to the Joshua Hendy Machine Works of this city, the manufacturers, for the immediate shipment to him of a Challenge feeder to replace the Loftus.

Comment upon the above relation of facts is deemed unnecessary, for "a word to the wise is sufficient," and intelligent mining and millmen may appreciate the statement thus placed before them in further substantiation of the long-recognized superiority of the Challenge feeders.

N.

## Mining Share Market.

The only advance of any note among stocks the last week was that of Ophir, followed by Mexican, and no special cause was assigned for that. Still what movement there is seems to be upward, and purchasing orders from the Comstock are getting heavier. The Virginia Enterprise says that the reports from the superintendents are encouraging. The Con. California and Virginia pan-mills have been shut down for a general cleanup. Careful comparisons will be made of the result of the pans operated under the Rae electrical process and the other pans. If the electrical business proves satisfactory the other half of the mill will be immediately rigged up with electric apparatus. Before the mill starts up again a brand new complement of wire ropes will be put in, and possibly a system of surface gearing will be put in to tighten the ropes.

The following companies have cash on hand according to the statements placed on file: Alpha, \$6306.40; Andes, \$6223.89; Alta, \$35,295.59; Bullion, \$28,873.47; Belcher, \$12,286.58; Belle Isle, \$30,080.74; Bodie, \$32,190.80; Bulwer, \$7319.87; Caledonia, \$2235.34; Challenge, \$14,950.98; Chollar, \$16,117.03; Con. California and Virginia, \$83,303.56; and \$83,539.38 in unsold bullion, with further shipments to arrive; Con. Imperial, \$9562.68; Confidence, \$3741.17; Crocker, \$1649.50; Dundley, \$767.16; Eureka, \$58,979; Exchequer, \$5299.01; Foundry, \$360.68; Gould and Curry, \$14,903.38; Holmes, \$35.79; Independence, \$5595.15; Julia, \$1070.04; Justice, \$9785.46; Lady Washington, \$9797.36; Mono, \$28,143.64; Mexican, \$1044.13; North Belle Isle, \$104,136.84, in cash and unsold bullion, amounting to \$43,560.86, with further shipments to arrive; Ophir, \$12,807.69; Occidental, \$8376.66; Orleans, \$1070.04; Overman, \$39,660.36; Peer, \$2534.54; Peerless, \$15,355.77; Ponders, \$339.29; Scorpion, \$5540.05; Standard, \$84,900.34; Syndicate, \$10,435.89; Sierra Nevada, \$14,165.49; Union, \$42,192.23; Utah, \$16,650.11; Weldon, \$5819.73.

The following companies have an indebtedness: Best and Belcher, \$8618.41; Commonwealth, \$33,454.69; Crown Point, \$30,825.03; Grand Prize, \$47,013.89; Hale and Norcross, \$5287.07; Locomotive, \$3686.01; Mt. Cory, \$12,977.15; Nevada Queen, \$7903.22; Navajo, \$25,210.24; Potosi, \$14,163.72; Seg. Belcher, \$12,376.53; Savage, \$32,292.51.

## Don't Fail to Write,

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## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING JANUARY 31, 1888.

377,352.—HAND-CAR—Deodatus Chapel, S. F.  
377,067.—HARVESTER—J. B. Gemmill, Red Bluff, Cal.

377,115.—TESTING THE FAIRNESS OF ENGINE CRANK SHAFTS—John Paterson, S. F.

377,272.—AMALGAMATOR—N. L. Raber, Corvallis, Ogn.

377,274.—TRACTION ENGINE—D. L. F. Remington, Woodburn, Ogn.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Mount Diablo, Feb. 4, \$10,631; Grand Prize, 4, \$26,000; Hale and Norcross, 4, \$32,000; Moulton, 4, \$19,648; Silver Bow, 4, \$18,080; Lexington, 4, \$32,064; Pollock, 4, \$7568; Moulton, 6, \$17,584; Eureka Con, 4, \$21,972—total for January, \$43,564; Hanauer, 4, \$1950; Germania, 4, \$1537; Hanauer, 5, \$2000; Crescent, 5, \$3550. There were shipped from Salt Lake City during the week ending with Saturday, February 4th, 22 cars bullion, aggregating 752,818 pounds; 40 cars silver and lead ore, 1,177,000 pounds; 1 car copper ore, 29,000, and 1 car matte, 28,000 pounds, making a total of 64 cars, amounting to 1,989,818 pounds.

MINING ENGINEERS.—The American Institute of Mining Engineers will hold its 13th annual meeting at Boston, Mass., beginning Tuesday, Feb. 21, 1888. A number of visits will be made to local industrial establishments, and the annual election will occur. A number of interesting papers will be read, among them the following: "Formation of Fissure Veins," by S. F. Emmons; "Theory of Jigging," J. C. Bayles; "Topography and Geology of the Cerro de Pasco, Peru," A. D. Hodges, Jr.; "Russell Process in its Practical Application and Economical Results," Ellsworth Daggett; "Improved System of Water Supply for Hydraulic Mining," H. D. Pearsall; "System of Mining in Large Bodies of Soft Ore," R. P. Rothwell.

MINING BUREAU CONTRIBUTIONS.—Among the recent contributions to the collection of the California State Mining Bureau are the following: Large specimen anthracite coal, Colorado, E. E. Chever; fine specimen calcantite from the Bluestone mine, Walker River, Nevada, Jno. D. Ludwig; lignite of good quality, Alaska, E. Boggs; rich silver ore, Ruby Hill, White Pine district, Nevada, C. H. Allen; gold quartz, Golden Gate mine, New River district, Trinity Co., Cal., R. Gibson; diatomaceous earth, Eureka, H. B. C. Bachelder; silver ore (with gold), Wagontown, Idaho, A. E. Walton; silver ore (sphenoid of silver in kaolin), Idaho, M. Attwood; mirabilite, San Bernardino Co., J. H. Plant; opal, Melville Attwood.

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## San Francisco Metal Market.

WHOLESALE. THURSDAY, Feb. 9, 1888.	
ANTIMONY—French Star.....	94 @
COPPER—	
Bolt.....	26 @ 30
Sheeting.....	16 @ 25
Ingot.....	16 @ 18
Fire Box Sheet.....	23 @ 26
IRON—Glenbrook ton.....	@ 30
Eglington, ton.....	@ 28
American Soft, No. 1, ton.....	@ 25
Oregon Pig, ton.....	21 @ 23
Clay Lane White.....	22 @ 20
Spot, No. 1.....	31 @ 00
LEAD—Pig.....	5 @ 00
Shot.....	5 @ 00
Shot, discount 10% on 500 bag Drop, 1 bag.....	1 @ 80
Buck, 1 bag.....	2 @ 00
Chilled, do.....	2 @ 20
STEEL—English, lb.....	16 @ 25
Black Diamond, ordinary sizes.....	16 @ 18
Flow.....	4 @ 5
Machinery.....	4 @ 6
Naylor & Co.....	10 @ 6
TRIPLATE—Coke.....	5 @ 60
Charcoal.....	6 @ 75
QUICKSILVER—By the flask.....	45 @ 00
Flasks, new.....	1 @ 00
Flasks, old.....	5 @ 00

## MINING SHAREHOLDERS' DIRECTORY.

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COMPANY.	LOCATION.	No.	AM'T. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Alpha Con M Co.....	Nevada.....	1.	25.	Jan 9, Feb 15, Mar 6, C. E. Elliott.....	369 Montgomery St	
Blue Lakes Water Co.....	California.....	1.	1.00.	Dec 12, Jan 20, Feb 14, R. N. Van Brunt.....	318 Pine St	
Best & Belcher M Co.....	Nevada.....	33.	50.	Jan 4, Feb 9, Mar 2, L. Osborn.....	339 Montgomery St	
Baker Divide M Co.....	California.....	15.	25.	Jan 7, Feb 13, Mar 5, D. M. Kent.....	320 Pine St	
Crown Point G & S M Co.....	Nevada.....	45.	50.	Jan 4, Feb 8, Mar 2, J. Newlands.....	329 Pine St	
Chollar M Co.....	Nevada.....	21.	10.	Dec 5, Jan 10, Jan 31, C. E. Elliott.....	39 Montgomery St	
Commonwealth Con M Co.....	Nevada.....	6.	50.	Dec 29, Feb 6, Mar 13, H. Deas.....	339 Montgomery St	
Comet Con M Co.....	Califia nia.....	4.	3.00.	Jan 6, Feb 17, Mar 14, H. Lacy.....	321 California St	
Eva Con M Co.....	Nevada.....	1.	15.	Jan 5, Feb 10, Mar 5, J. Stedfield Jr.....	309 Montgomery St	
Exchequer M Co.....	Nevada.....	25.	20.	Feb 7, Mar 17, Apr 4, C. E. Elliott.....	333 California St	
Flower M Co.....	Nevada.....	5.	20.	Jan 13, Feb 17, Mar 9, L. P. Holden.....	113 Leidesdorf St	
Found Treasury M Co.....	Nevada.....	2.	06.	Jan 21, Mar 9, Mar 28, J. Stedfield Jr.....	419 California St	
Gray Eagle M Co.....	Calif nia.....	5.	14.	Jan 4, Feb 10, Mar 3, T. W. Zel.....	522 Montgomery St	
Gonesssee M Co.....	Nevada.....	1.	03.	Jan 10, Feb 14, Mar 6, E. F. Stone.....	306 Pine St	
Iowa M Co.....	Nevada.....	18.	25.	Dec 21, Jan 24, Feb 11, O. B. Higgins.....	408 California St	
Mayflower M Co.....	California.....	40.	50.	Jan 19, Feb 23, Mar 16, J. Morizo.....	328 Montgomery St	
Mexican G & S M Co.....	Nevada.....	35.	25.	Jan 17, Feb 21, Mar 13, C. E. Elliot.....	309 Montgomery St	
Manhattan M Co.....	Nevada.....	7.	10.	Jan 8, Jan 12, Jan 31, J. Crockett.....	347 Pine St	
Mon. G M Co.....	Cal fornia.....	25.	50.	Dec 20, Jan 24, Feb 23, C. W. Seaton.....	309 Montgomery St	
North Bonanza M Co.....	Nevada.....	8.	15.	Jan 10, Feb 15, Mar 14, J. J. Scoville.....	209 Montgomery St	
Navajo M Co.....	Nevada.....	18.	35.	Jan 10, Feb 14, Mar 6, J. W. Pew.....	310 Pine St	
Nevada Queen M Co.....	Nevada.....	35.	50.	Dec 16, Jan 24, Feb 16, H. Deas.....	309 Montgomery St	
Paradise Valley M Co.....	Nevada.....	2.	10.	Jan 22, Mar 1, Mar 13, W. L. Oliver.....	328 Montgomery St	
Quartz Mt G M Co.....	Cal fornia.....	20.	70.	Jan 17, Feb 21, Mar 13, E. B. Hestres.....	217 Sansome St	
Sierra Nevada M Co.....	Nevada.....	97.	25.	Dec 7, Jan 11, Jan 30, E. L. Parker.....	309 Montgomery St	
Spring Valley G M Co.....	California.....	2.	06.	Jan 11, Feb 18, Mar 18, H. Pichior.....	320 Sansome St	

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE
Alabama, Humboldt & Bailey M Co.....	W. H. Watson.....	302 Montgomery St.....	Annual.....	Feb 10	
Holmes M Co.....	C. E. Elliott.....	309 Montgomery St.....	Annual.....	Feb 14	
North Peer M Co.....	Arizona.....	309 Montgomery St.....	Annual.....	Feb 24	
Watt & De Gravel M Co.....	California.....	3 Post St.....	Annual.....	Feb 28	
West Comstock M Co.....	Nevada.....	T. W. Nowlin.....	320 Montgomery St.....	Special.....	Feb 18

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
California & Va M Co.....	Nevada.....	H. R. P. Hutton.....	309 Montgomery St.....	25	Feb 3
Eureka Con M Co.....	Nevada.....	J. W. Pew.....	310 Pine St.....	50	Feb 2
North Belle Isle M Co.....	California.....	J. Morizo.....	328 Montgomery St.....	95	Sept 17
Russell Reduction & M Co.....	California.....	F. E. Berier.....	320 Sansome St.....	44	Sept 15
Standard Con M Co.....	California.....	J. W. Pew.....	310 Pine St.....	65	Jan 12

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Jan. 19.	WEEK ENDING Jan. 26.	WEEK ENDING Feb. 2.	WEEK ENDING Feb. 9.
Alpha.....	1.40	1.55	1.45	2.40
Alta.....	1.90	2.00	1.80	2.30
Andes.....	1.15	1.25	1.20	1.40
Argenta.....	.....	.....	.....	.....
Belcher.....	5.50	7.00	5.50	6.25
Best & Belcher.....	5.50	6.50	6.50	7.50
Bullion.....	1.45	1.65	1.50	1.65
Baltimore.....	.....	.....	.....	.....
Bodie.....	2.30	2.75	2.45	2.50
Benton.....	.....	.....	.....	.....
Bodie Tunnel.....	.....	.....	.....	.....
Bulwer.....	.....	.....	.....	.....
Con. Va. & Cal.....	2.10	3.20	3.70	6.00
Challenger.....	.....	.....	.....	.....
Chollar.....	.....	.....	.....	.....
Confidence.....	.....	.....	.....	.....
Con. Imperial.....	.....	.....	.....	.....
Caledonia.....	.....	.....	.....	.....
Con. Pacific.....	.....	.....	.....	.....
Crown Point.....	.....	.....	.....	.....
Crocker.....	.....	.....	.....	.....
Central.....	.....	.....	.....	.....
Dudley.....	.....	.....	.....	.....
East B. & E.....	.....	.....	.....	.....
Eureka Con.....	.....	.....	.....	.....
Exchequer.....	.....	.....	.....	.....
Grand Prize.....	.....	.....	.....	.....
Gould & Curry.....	.....	.....	.....	.....
Hale & Norcross.....	.....	.....	.....	.....
Holmes.....	.....	.....	.....	.....
Independence.....	.....	.....	.....	.....
Iowa.....	.....	.....	.....	.....
Julia.....	.....	.....	.....	.....
Justice.....	.....	.....	.....	.....
Kentucky.....	.....	.....	.....	.....
Lady Wash.....	.....	.....	.....	.....
Martin White.....	.....	.....	.....	.....
Mono.....	.....	.....	.....	.....
Mexican.....	.....	.....	.....	.....
Mt. Diablo.....	.....	.....	.....	.....
Northern Belle.....	.....	.....	.....	.....
Nevada.....	.....	.....	.....	.....
North Belle Isle.....	.....	.....	.....	.....
Niagara.....	.....	.....	.....	.....
Nev. Queen.....	.....	.....	.....	.....
North G. & O.....	.....	.....	.....	.....
Occidental.....	.....	.....	.....	.....
Ophir.....	.....	.....	.....	.....
Overman.....	.....	.....	.....	.....
Potosi.....	.....	.....	.....	.....
Peerless.....	.....	.....	.....	.....
P. T. White.....	.....	.....	.....	.....
P. Sheridan.....	.....	.....	.....	.....
Silver Star.....	.....	.....	.....	.....
Savage.....	.....	.....	.....	.....
Seg. Belcher.....	.....	.....	.....	.....
Sierra Nevada.....	.....	.....	.....	.....
Silver Hill.....	.....	.....	.....	.....
Silver King.....	.....	.....	.....	.....
Scorpion.....	.....	.....	.....	.....
Syndicate.....	.....	.....	.....	.....
Union.....	.....	.....	.....	.....
Utah.....	.....	.....	.....	.....
Yellow Jacket.....	.....	.....	.....	.....

## Sales at San Francisco Stock Exchange.

THURSDAY Feb. 9, 1888.	190	Gould & Curry.....	5.25
500 Alca.....	2.10	1050 Grand Prize.....	2.25
50 Andes.....	1.65	480 Hale & Nor.....	101
50 Alpha.....	2.35	100 Justice.....	1.00
365 B. & Belcher.....	6.50	100 Lady Wash.....	45c
120 Belcher.....	7.75	190 Mexican.....	5.50
200 Bullion.....	1.70	20 N. Belle Is.....	7c
50 Bodie.....	2.60	200 Nev. Queen.....	2.40
100 Bodie.....	1.00	200 Navajo.....	1.45
26 Challengers.....	5.00	50 Ophir.....	1.11
375 Chollar.....	6.00	400 Overman.....	2.30
169 Con. Va. & Cal.....	1.70	100 Occidental.....	1.65
70 Crown Point.....	7.00	860 Savage.....	7.75
80 Confidence.....	1.00	300 Sierra Nevada.....	2.25
50 Con. Imperial.....	3.00	50 Scorpion.....	3.85
200 Con. Pacific.....	3.00	200 Union Con.....	4.85
30 Eureka Con.....	1.50	100 Utah.....	2.10
1050 Exchequer.....	1.25	520 Yellow Jacket.....	9c

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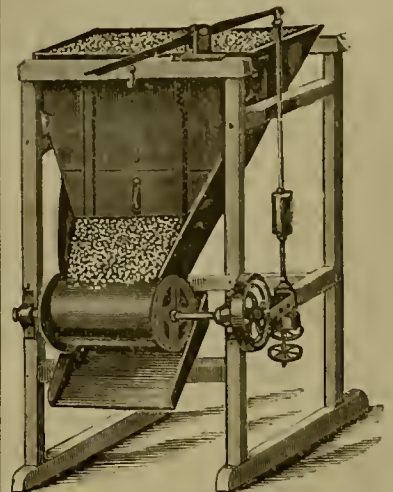
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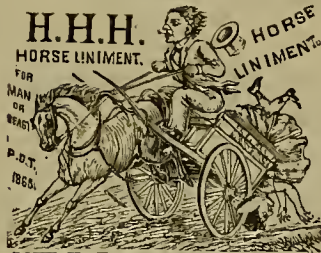
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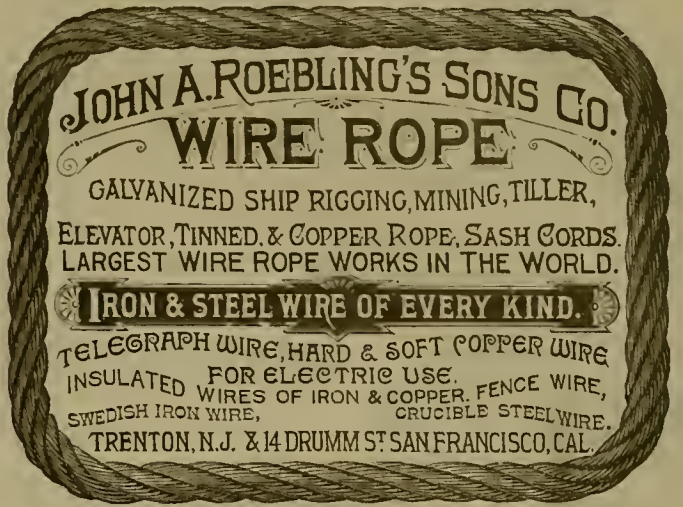
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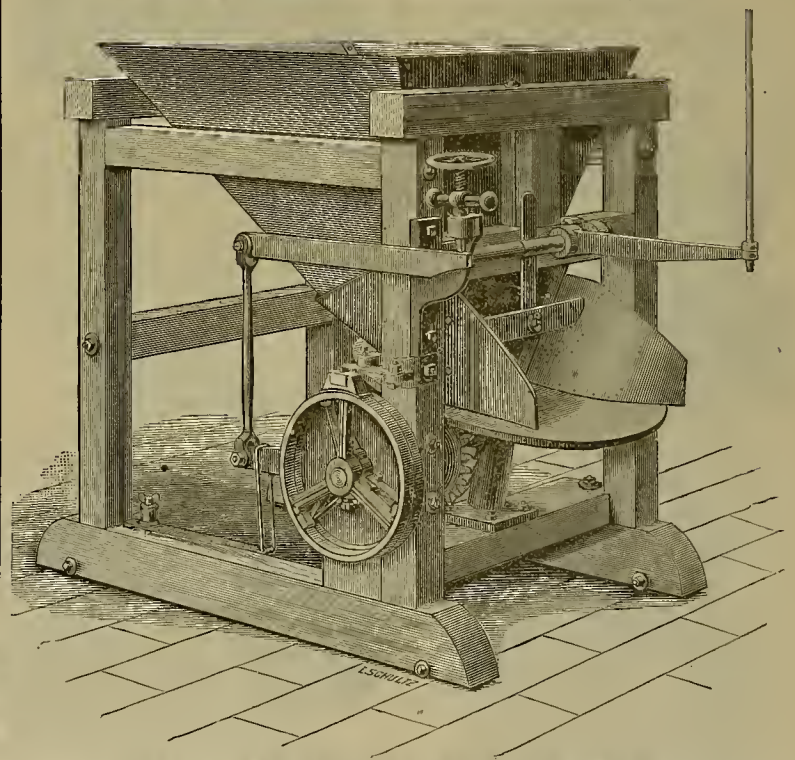
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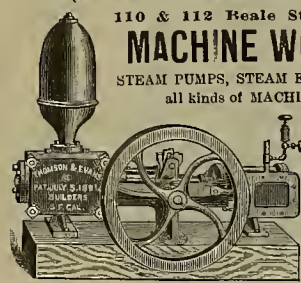
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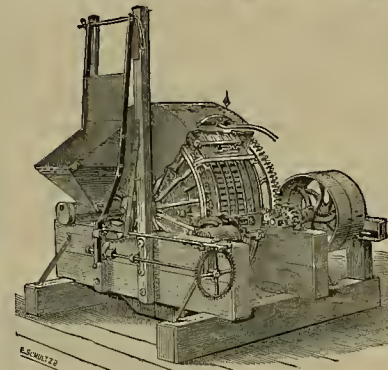
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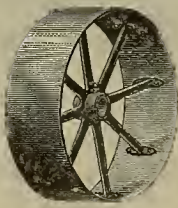
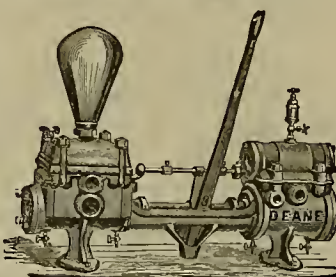
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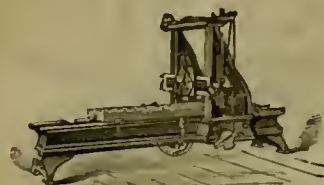
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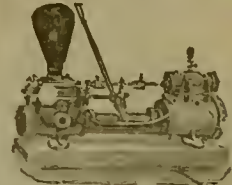


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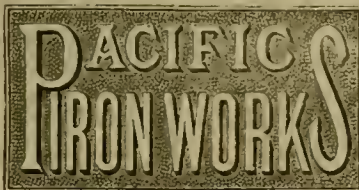


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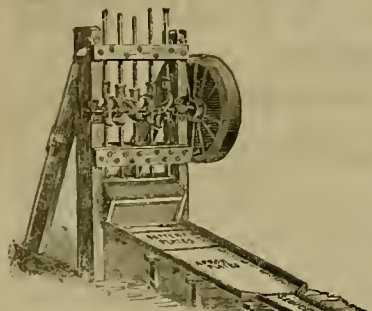
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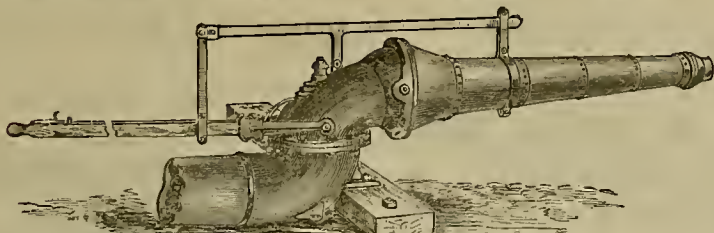


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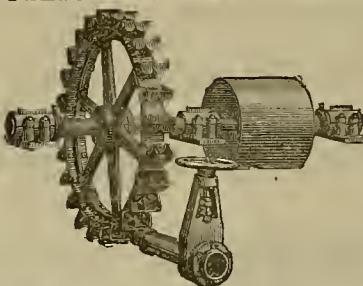
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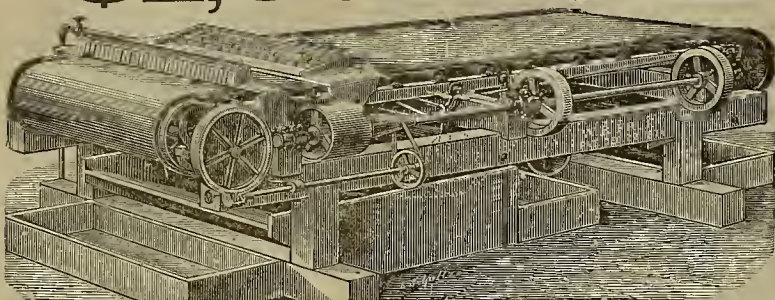
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THE MONTANA COMPANY (Limited), LONDON, October 8, 1885.

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N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frue and more stamps have been purchased.

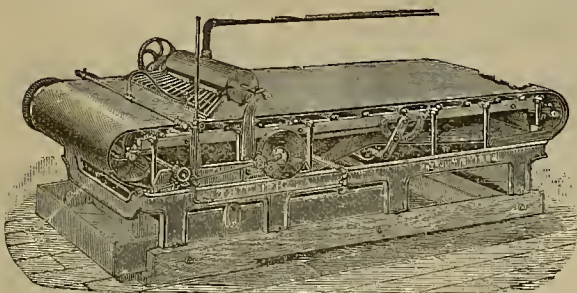
ADAMS & CARTER.

Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

**ADAMS & CARTER, Agents Frue Vanning Machine Co.,  
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The present improved form of the celebrated "TRIUMPH" Ore Concentrator possesses many advantages over any other style of Vanners, Vanning Machines, or Concentrators, yet introduced to the notice of mining men. These advantages consist in the superior features which enter into their construction, and facilitate their operation.

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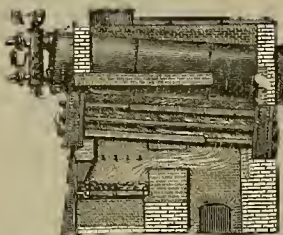
L. R. MEAD, Secretary.

# RISDON IRON & LOCOMOTIVE WORKS

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Manufacturers and Sole Agents for the Pacific Coast for

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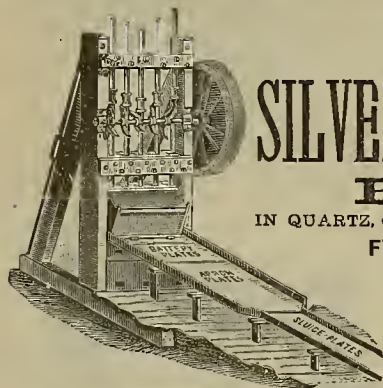
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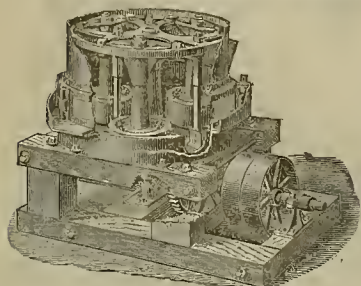
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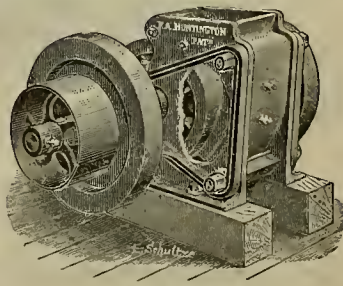
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Centrifugal Roller Quartz Mill.



ORE CRUSHER



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, FEBRUARY 18, 1888.

VOLUME LV  
Number 7.

## Testing Fairness of Crank Shafts.

John Paterson of Victoria, B. C., has recently patented, through the MINING AND SCIENTIFIC PRESS Patent Agency, an instrument to be used upon steam engines to gauge or test their several parts in their operation. It places in the hands of engineers, engine-builders and others a correct and speedy method of testing and adjusting the crank shafts. The engravings given herewith show the application of the device. Fig. 1 is a plan of the instrument showing it in position. Fig. 2 is a cross section through the sliding head *H* and connected parts.

*A* is the piston rod of the engine, *B* is the connecting rod, *C* is the crank shaft, *D* is the crank and *E* is the crank pin.

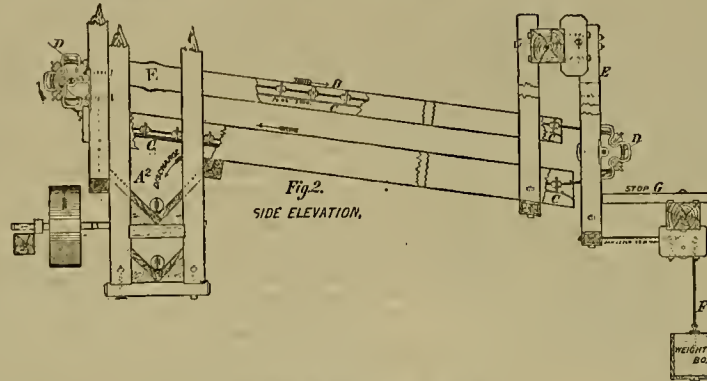
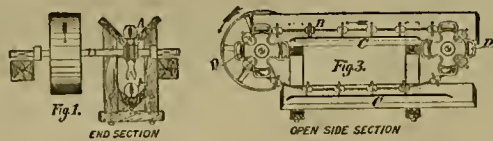
*F* is a frame, preferably of brass, and connected at *f* with the working part of the piston rod *A*. *G* is a rod, bar or tube (preferably the latter for the sake of lightness), which is fitted in the other end of the frame *F*, in sockets therein, so that it may be adjusted lengthwise, it being fixed in the position to which it is adjusted by the set screws *g*. The rod *G* lies in the same horizontal plane as the piston rod and extends a few inches beyond the center of the crank shaft, forming practically a perfectly parallel extension of the piston rod *A*. On the end of rod *G* next the shaft is carried the sliding adjustable head *H*, adapted to be set in position by a screw *h*, and fitted on the top side with a small level *I*. In the end of head *H*, and next to the shaft, is fitted and adapted to rotate the hub *j*, in which is fitted the radial arm or tube *J*, which is adjustable lengthwise and is set by a screw *j*. The outer end of this arm carries a sliding head *K*, adapted to be set by a screw *k*, and having fitted to it adjustably a pointer *L* set by a screw *l*. A pointer *M* is fitted in the end of the hub *j*, of arm *J*, and is adapted to move endways therein, said named pointer being for the purpose of setting the instrument in order that the pointer *L* may revolve concentric with the path of the crank pin.

If the outside of the crank pin is flat, or has been bruised, it will be necessary to drill a small hole in the center and put in a pin, represented by *e*, allowing it to project about one-eighth of an inch.

To use the instrument, first disconnect the connecting rod from the crank pin, leaving the cross head about one inch from its extreme outward travel. After setting the head *H* perfectly level, by the means of the level in its top, center the pointer *M* on the crank shaft *C*, then turn the crank shaft around and adjust the pointer *L* to the center of its crank pin, then gauge said pin at the outward and inward centers of the crank thereon, by the pointer *L*. It will thus be readily perceived whether the shaft is rectangular with the line of the cylinder, then turn the crank pin to the top and then to the bottom, following with the pointer *L*, which will show at once whether the shaft is level or not.

The application of this instrument will show the slightest variation of the shaft from the rectangular path of the piston's travel, and at the same time point out the slightest variation

of the shaft from a true level. This it will accomplish in a few minutes, without the labor and great loss of time required to take out the piston, center the cylinder, apply a line and



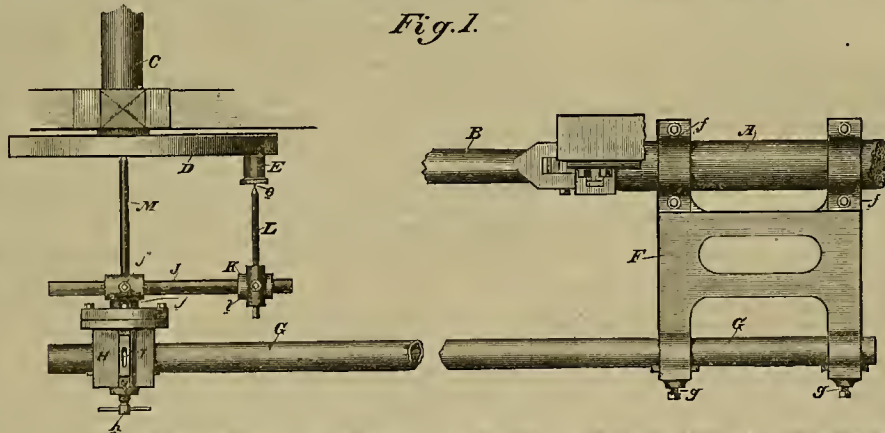
WIRE ROPE CONVEYOR.

level, as is usually done, involving a heavy loss, as, for example, in the case of large engines used in driving the machinery of factories and mines.

The advantages resulting from the use of this instrument are the absence of hot bearings, saving of brasses and oil, increase of power as

been no less so to the mining interests of California. The heavy storms that prevailed in the month of January, consisting of rain at lower altitudes, left a deep deposit of snow on the northern Coast Range and on the Sierra Nevada mountains. This snow, becoming impacted, laid a good foundation for more to fol-

Fig. 1.



INSTRUMENT FOR TESTING FAIRNESS OF STEAM ENGINE CRANK-SHAFT.

well as reducing to a minimum the risk of breaking shafts and crank-pins with the accompanying wreckage resulting therefrom. In situations where a number of steam engines are under one ownership or control, only one instrument will be required. Being made for the largest engine, it is only necessary to have bushings bored, and in halves to fit the various sizes of piston rods, and turned outside to fit the frame; while any convenient length of tube may be used as well as a number of pointers of various lengths. In order to test the instrument at any time it is only necessary to turn the radial arm around against a plumb line to test the level, and against the largest tube to test the other two points.

SENATOR STEWART'S bill to amend the mining laws has been favorably reported.

## Mining Operations Active.

The weather which thus far the present year has proved so propitious to the agricultural has

good wages, where, if they had to buy water, this would be impracticable. It is possible now to wash in the dry diggings and practice ground-sliding, neither of which can be done to any great extent in the dry winters. Since the advent of the warm weather the hydraulic miners have got to work, the snow and ice having so obstructed the ditches in the early part of the season that they could do but little even in the most favored localities. Everything considered, the mining outlook, not only in California but throughout the entire coast, is exceedingly good, an unusually prosperous year awaiting, without any doubt, those engaged in this industry.

## Garland's Cable Conveyors.

Garland's patent system of cable-power transmission and conveyors is used for log haul-up works, pumping mines and deep wells, grain elevators, and for conveying coal, iron, etc. We give on this page a cut of the wire-rope conveyor. The form of the sprocket-wheels is the same as in ordinary cable-wheels except at the gaps or cut-outs to receive the clamps and complers.

At *D* in Figs. 2 and 3 the tooth in the cable-wheel is shown with a cut-out, so that soft and fine substances will be forced out between the flanges of the sprocket-teeth. Fig. 2 shows the construction for clear sawdust and fine coal.

Dust, etc., may be carried with the lower cable when comparatively clear from sticks, shunks, etc., as shown in Fig. 2, but when harks, offal, and such like are to be carried it is best to convey with the upper cable as shown

in Fig. 1, only it should be carried over as shown in Fig. 2, and the upper section cut away so that it will make the discharge at *E*, on each side of the cable, and over, and at each side of the lower cable *C*, down as shown at *A*2.

The sides of the carrier are set at an angle of 45 degrees, and a strip of hand iron is fastened to the carrier sides in a cross-horizontal position under the cable, so that the clamps *B* rest upon it and do not wedge in between the sides *AA*.

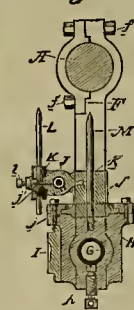
The wheels *D* are 24-inch diameter, for one-half-inch cable, and 30-inch diameter for five-eighths and three-fourths inch cable. Clamps four-inch diameter are used on one-half-inch cable; five-inch diameter on five-eighths-inch cable, and five or six inch on three-fourths-inch cable.

One great advantage in this system is, that the cable can be spliced with one of the patent clamp couplings at any point, and the coupling forms one of the clamp conveyors, and runs on the wheel in the same space. H. P. Gregory & Co. are Pacific Coast agents for this device.

THE Carson Tribune says: The new ore discovered near Carson is the general topic of conversation, and the greatest confidence is felt as to its future.

THE Pittsburg gold mines, Lander Co., Nev. are shipping over \$9000 in gold bullion every week, which is the product of two Huntington mills.

Fig. 2.





## CORRESPONDENCE.

We admit, unadvised, opinions of correspondents.—E.D.S.

## Mexican Mines.

EDITORS PRESS:—In former letters you were informed of some mines and mining enterprises in Sonora which are in possession of English companies; this time the history of a mine is submitted, which property seems not to be inferior to the most profitable ones in this State, and which may be yet had for the asking of it, providing the asking is backed by a substantial check or warrant of some acceptable sort. The mine, or a part of it, being in the market, has for some reasons to be called by a fictitious name, and thus Santa Victoria will do just as well as any canonized saint. The following lines are mostly extracts from a report of a mining engineer.

About 25 miles east from the Sonora railroad, over a road which can be made passable for teams at a probable expense of \$3000, is situated the Santa Victoria mine, or mines, as there are several ledges embraced in the claim. The mountain chain, which is an out-runner of the Sierra Madre, consists of a dark syenite, occasionally traversed and overlaid by dykes and large masses of limestone. The country affords many varieties of timber necessary for mining purposes and an ample supply of excellent firewood. Flowing water for milling purposes can be had two miles above the mine and brought down to the mine by ditch or pipes.

The Santa Victoria mine was discovered in 1817 and worked by Spaniards. Subsequent revolutions brought the mine into Mexican hands, not as skilled in the art of mining nor possessed of the same resources as their predecessors, and also more profligate, reckless and careless concerning the working of the mine and minerals, as well as of spending the silver taken from it. As usual in such cases, the silver ore was extracted wherever found, without the least consideration of the security of the works nor of future opening and working. In such a shipshod manner the mine was worked by its owner for half a century, supporting him and his large family and dependents, the working being occasionally interrupted or accelerated by the Apaches, who formerly favored this part of the country with their visits, as numerous graves and crosses by the roadside will testify.

The mine proper consists of three ledges. No 1 is the discovery ledge or *veta de la posicion*. A small tunnel was run in at an elevation of about 250 feet above the arroyo; the ledge shows six feet wide with fair assays of silver throughout the whole width, but owing to the discovery of much richer ore in an adjoining ledge, and to the fact that this ledge seems to originate from some larger deposit of a greater depth, it was abandoned for ledge No. 2, 65 feet east of the discovery tunnel. A tunnel was run into this ledge, showing it to have a course of south 35° east, a thickness of five feet between walls and a dip of 56° to the north. This ledge has been worked from the surface down by tunnels and by shafts to a probable depth of 200 feet, and large quantities of pay ore were taken out by the old and rude ways of notched timbers, on which the men climbed up like monkeys with a load of ore in a rawhide basket on their backs. As before mentioned, the works were carried on with but little consideration for the safety of the mine; it is therefore unsafe to examine them closely. From the walls small amounts of rich ore, consisting of ruby silver which were left hanging, were taken out, and testified to the value and character of the ores extracted.

The main tunnel into this ledge is 120 feet long, cutting the ledge evidently in ore as shown by large vacant chambers, assays of remnants yielding up to 600 ounces silver per ton, and is connected with the workings above. Within this tunnel, near the end of it, a shaft was sunk about 80 feet deep, and by means of a small crosscut a stringer of the ledge was out at that depth, which shows 18 inches of ore assaying \$229 in silver and \$27.80 in gold, of a character which bids fair to be permanent, and rivals the silver glance of Tocucitita.

But the work on this part of the ledge had to be discontinued on account of lack of ventilation. The stringer of ore has a course parallel to the ledge, showing by its dip and by the absence of defined walls that it is a mere stringer and its tendency to join the main ledge at a depth of about 50 feet.

Ledge No. 3 is the strongest ledge of the system and somewhat opened by short shafts and drifts, which are distant about 200 feet east of the main tunnel. Its width increases rapidly from 2½ feet to 6 feet at a depth of 20 feet. This ledge has been gouged out, from the top of the mountain down, with the same lack of system and care. Wherever the workings became "effluated," or where rebellious ores were struck, they were abandoned and another place worked, by which chloride ores could be extracted. A similar case was the mines in Catorce and Zicatene, where, after passing ore bodies easy to be benefited by the simplest amalgamation, a transition was encountered in which antimonial and arsenical sulphide ores appeared which did not yield as readily its precious metal, when many a promising mine, which now commands millions, was abandoned and left to its fate.

By the course and relative dip of the three just mentioned ledges, it is evident that there

is a strong probability of their joining. A 100-foot shaft, with its proper drifts, would and will prove the presence of virgin ore bodies. It is now merely a question of *quien sabe* who will prove this to be a fact; or possibly it is only a question of time. The present holders are the Mexicans who formerly worked the mine a part of the time, and who are, of course, unable to do more than hold the mine.

THEO. G. ED WOLLER.

Hermosillo, Mexico.

## Sparta Mines, Oregon.

EDITORS PRESS:—In collecting statistics for publication in the review of last year's business, some delay was occasioned by owners of the principal placers leaving before such information could be obtained, and which necessitated considerable correspondence before the facts now embodied in this report could be secured. The gold-bearing quartz mines are attracting considerable attention, and it is hoped the next season will see mills constructed for the proper reduction of our ores, and forever put to rest the imperfect arastras which are now the only means of getting the values out of the mines. The amount of ore treated in the six different arastras aggregates in round numbers 1137 tons, showing a cleanup of \$24,331.80, or \$21.40 to the ton. The sulphurets, which contain the greatest value, are entirely lost, and not over 65 per cent of the free gold saved. During the past season the coarsest gold has been found in Betsey Gulch, many of the nuggets weighing an ounce or more and of superior quality.

Shanghai, Rattlesnake, Tackle, Sawmill, Blue, Red, Maiden, Town, Skillet, Cow, Bear, Lovers, Hungry, Gem, and Bolivar, are the principal gulches worked. The output from the old channel of Eagle creek has averaged \$7.40 to the hand, and the bars on Eagle creek proper have paid handsome returns to the miners. Considerable ground has been worked on Lower Powder river, but owing to imperfect facilities for handling the water, only moderate wages has been made. Nearly one-half of the placer mines are owned and worked by Chinese, which makes it difficult to secure correct returns, as they only sell enough of their gold to pay expenses and ship the balance to China.

From the best information obtainable, and computing that two-fifths of the gold washed was by Chinamen, not less than \$325,000 was taken from the above-named gulches, making the output from Shanghai gulch alone, since its discovery, \$1,800,000.

The capacity of the Sparta canal, which is 32 miles in length, will be increased several hundred inches, and the water raised 125 feet higher, carrying it over the Powder river divide, which will furnish to hundreds of miners rich placer ground for the next quarter of a century. With proper facilities for treating the inexhaustible supply of gold ores, and miners enough to work the available placer grounds, the output of gold for the year 1888 will exceed \$2,000,000.

SILAX.

## Treatment of Cobalt and Nickel Ore in a Converter.

[Written for the Press.]

A great change has taken place in the last three years in the treatment of cobalt and nickel ore. Old processes are done away with. New and improved ones have taken their place, but none of the metallurgical discoveries in this branch of business has been more successful and more pregnant with benefit to the manufacturers than the employment of converters.

The first reduction works which adopted this process and employed it with great success for the poorer class of ore, was the German Reduction Works, for cobalt and nickel.

The ore worked is mostly from Norway and Sweden. They are periferous iron, containing only 2 to 4 per cent of cobalt and nickel; they are shipped as mined to the reduction works in Germany. Here they are melted in three cupola furnaces or a blast furnace, which is 5 m. high and 1 m. diameter. They have three tuyeres of 7 c. m. diameter, and 80 c. m. above the furnace bottom. The slag is running continually from the furnace through a slag hole 60 c. m. above the bottom, especially designed for this purpose. Every three hours the matte is tapped from the furnace. The fuel is coke and the blast has a pressure of 20 c. m. water. The charge consists of 140 pounds burned lime, 1000 pounds ore, 100 pounds limestone, and slag from the converter.

The capacity of the furnace in 24 hours is 20 tons of ore, 1½ tons slag, 2 tons of matte of about 30 per cent cobalt and nickel. The run of the furnace is two to three months. After the ore is thus melted and concentrated, the matte is immediately discharged from the furnace into the converter.

The converter is a vertical cylinder, lined with refractory material, having inclined tuyeres at the sides, and is otherwise very similar to those used for the production of steel.

The matte of 30 per cent is here in the converter concentrated from 75 to 77 per cent, cobalt and nickel matte, which is now ready for the wet process.

The process in the converter commences at once when the blast is put on. The flame is in the beginning short and yellow. The flame gets whiter and great clouds of fume issue after two

to three minutes. Sulphur and arsenic escape and the whole contents begin to boil violently. With the oxidation of the iron in the last stage of the process, the fume disappears and the flame gets lighter and lighter. In from 20 to 25 minutes the process is finished. The whole mass is discharged into an iron mold, where a separation, according to the specific weight, takes place. The slag gathers on the top, the matte below. This matte contains now from 75 to 77 per cent of cobalt and nickel, the slag 1 to 2 per cent. The latter is easily dressed from the matte, and is afterward added again to the ore into the cupola furnaces.

This cheap, simple and beautiful process is claimed to be the invention of the French metallurgist Magnis and his engineer David, but tests to this and similar effects of the converter for the purpose of refining copper and nickel were made by the Prussian mining engineer Teminskow, in the year 1870.

WERNER LANGCOUTH.

## Elkhorn, Montana.

EDITORS PRESS:—The Elkhorn Mining Co. are again operating their mill after a shutdown of six months, required to pump the flood of water out of the mine. Advantage was taken of the shutdown to thoroughly overhaul the mill and erect a machine-shop fully equipped with lathes, planers, drills, etc., so that they can do their own repair and other work. A new Howell-White roaster was added to the mill and more pan capacity. They are now producing a 1600-ounce bar of silver bullion every 24 hours. A system of washing and hand sorting the ore has been introduced by the new superintendent, Mr. Pender, and tribute working of the mine.

The J. R. Keene Co. are employing about 12 men opening up their mine. No ore is being stopped, but they have taken out quite a large amount during development work.

The Relief Co. struck quite a large body of high grade silver ore on their 100-foot level. They are to increase their capital stock and a mill is talked of.

The Union Mining Co. are working steadily with a small force. They shipped a car of 100-ounce ore and have another carload of 250-ounce ore ready for shipment, and a large lot of lower grade ore on the dump.

The Paymaster has let a contract for a 100-foot shaft, and the Shober for a 100 foot tunnel. Both of these mines have shipping ore. The Keystone Co. are driving a tunnel to their vein, having so much water in the shaft that they cannot work it. They also have shipping ore on the dump. The Elkhorn Queen have contracted to run a drift 100 feet long on the 200 foot level to ascertain the extent of the ore shoot. The body is from 30 to 40 feet wide at the station. They shipped one lot of high-grade lead ore to the C. and D. smelter containing about 100 ounces of silver.

The C. and D. are doing only prospect work. They have about 2000 tons of \$40 ore on the dump and have shipped 1000 tons to their smelter, about 800 tons of which has been smelted. They have a large body of the same kind of ore variously estimated at from 40,000 to 50,000 tons. They shipped four carloads of lead bullion carrying from 8 to 12 ounces gold and from 120 to 170 ounces of silver. Owing to the high price and difficulty of getting coke, and not being prepared, they have shut down until spring. The Sophia has some very high-grade ore, but is not doing much. The camp looks better than at any period of its history, but needs a railroad, as there are large quantities of ore that pay little or no profit with high wagon freights. The Louise have struck a body of high-grade ore on their 100-foot level. It carries over 200 ounces of silver and a half-ounce in gold. They have some curious mineral in their mine, carrying iron, manganese, arsenic, antimony, lead, copper, silver, gold, and cobalt and nickel.

Elkhorn, Montana Jan., 1888.

## Indiana Silver Mines.

EDITORS PRESS:—The last silver bullion shipment from the Dubois Co., Indiana silver mines, has created a favorable impression, and a great number of people gathered to witness the 20-ton capacity smelter pouring out its 1500 pounds of concentrated silver bullion daily.

Since the last three weeks of blowing in this smelter the water-jacket has run to our perfect satisfaction. Some 300 tons of ore now at our smelting works averages, according to the U. S. mint assay reports, 58 ounces in silver and 4.10 ounces in gold per ton.

A good vein of coking coal was found within 50 yards of our smelting works; also plenty of lime-rock and iron ore. There is also galena for fluxing, so that the mining and smelting expenses here do not exceed \$4 per gross ton. More smelters will be erected early this spring. This is our fifth year of operation, and nothing has been said to the outside world to cause the foolish booming so detrimental to a new mining camp.

THE BUCK SHOALS MINING &amp; SMELTING CO.

NATURAL GAS.—Horace D. Dunn has addressed a communication to the directors of the Mechanics' Institute, suggesting that a meeting be called by them of manufacturers who use fuel for manufacturing purposes, with a view of ascertaining whether natural gas wells exist in the vicinity of this city, and how experimental wells may be sunk.

## Mill Tailings.

Perhaps some of our readers may be able to answer satisfactorily the question propounded in the following letter:

EDITORS PRESS:—My partners and myself have on hand over 1000 tons of mill tailings, accumulated from the crushing of gold-bearing quartz by a 10-stamp-mill several years ago. The tailings contain quite a large percentage of iron pyrites, or sulphurets, some free gold, a little amalgam, and some quicksilver, and lie on the side of a creek which in the spring has plenty of water for sluicing, for three or four months, and by that method, using rills and blankets, we can save only a portion of the sulphurets.

The creek does not afford water enough to justify erection of water-power machinery, and the tailings are not rich enough, or in quantity sufficient to justify putting up steam-power to run concentrators. If any of the readers of the Press can, through your columns, give us any information concerning a cheap method of working such tailings, which is an improvement on the sluicing process, they will oblige

Slater Creek, Arizona. S. A. SMITH &amp; Co.

PROTECTING WATER DITCHES.—It has been suggested by Grass Valley parties that a continuous and ample supply of water for the mines there can be insured during the winter months if the South Yuba Canal Company will adopt the plan of covering their ditches with poles and brush so as to prevent the snow from getting into them. A talk about the matter was had yesterday with Superintendent Brown. He says the covering plan is not practical for many reasons. The main ditch is where the worst troubles originate as a rule. Although it is eight feet wide and carries a large body of water, a low temperature causes the formation of anchor ice which commences growing from both sides and the stream becomes a solid mass of ice in an incredibly short space of time. Then much annoyance is frequently occasioned along the stretches of fluming, for if the water once commences overflowing during a "cold snap" it freezes on the outside of the boxes and as the mass of ice grows it extends into the flume with the result of effectually blocking it. A particularly bad place is the four-mile section of ditch from Quaker Hill down to Crystal Springs. Mr. Brown says the shutting down of the water supply is generally caused by the water freezing and not by snow. In his opinion any attempt at keeping up the flow by covering the ditches would be a senseless waste of time. If an accident should occur to the ditch the work of repairing it would be next to impossible were it covered, as the covering might all have to be removed in searching for the point where the trouble originated.—*Nevada Transcript*.

SMELTING WORKS WANTED.—The Esmeralda (Nev.) News says: The importance of suitable facilities for the economical reduction of ore in the several mining districts of this county was never more apparent. Under present circumstances our mine-workers are compelled to ship their ore to Selby's or some other works away from home that it may be worked and its product added to the many millions of dollars already produced by the mines of our county. There is then a question which should present itself to the capitalist and to the people here who are anxious for better times. If the Selby Smelting and Reduction Works, situated as it is in a county where no mining is being done and hundreds of miles distant from our mines, which have furnished it hundreds of tons of ore, can be successfully operated and to a great profit to its owners, then why may not such works be erected and thus operated in our county? There is every possible inducement here for those who can to erect such works here; water-power can be had, fuel obtained at a small cost, and ore in unbounded heaps awaiting to be reduced which cannot bear the expense of transportation. There is an abundance of ore; yes, sufficient to keep at least a dozen such as Selby's and the Reno works constantly engaged.

ALABAMA GOLD.—A correspondent of the *Chronicle*, writing from New York, says: I met Riette, the ex-San Francisco metallurgist, mine expert, chemist and engineer the other day on the "L." road, carpet-bag between his knees, and a big map in his grasp. He had just returned from a mining pilgrimage—a search for a gold mine—in no less a State than Alabama. Expressing some surprise at the existence of gold mines in that State, Riette assured me that they existed, but unfortunately the quantity was insufficient to make its mining a successful investment. Said Riette: "The rock will show about \$2 per ton, perhaps \$2.50, but it is so very light you can't save it. Reminds me of what Old Cash used to call it, 'Takes a pound to make an ounce, and the ounce is mighty hard to keep when you get it.' That's the trouble with the gold mines of Georgia, North Carolina and Virginia. You get nice colors in your pan, or horn, you get good assays, but when you come to work it the fine stuff generally gets away. There are some good mines down there. I ran through 100 tons last year for a Georgia company and got a bar worth \$960, but the gold was coarse and easily saved. Where am I going to next? Oh, I don't know yet. I want to go down to South America. They've got some world-heaters down there, they tell me, and I want to see them."



## Labor and the Laborer in California.

## A Report to the State Board of Trade.

The California State Board of Trade recently appointed a committee, of which Hon. M. M. Estee is chairman, to prepare a report on labor and the conditions affecting the laborer in California. The following report was submitted at the meeting on Tuesday of this week:

We know of no place where the man who seeks employment can do better than in California. The success of men who toil depends largely on the three questions of, first, steady employment; second, good wages; third, cheap living.

Steady employment is all-important. The opportunities that laborers have in California to get work and the facilities for doing the work they have make this the best place for the bread-winner to live in. In this State and in almost every field of industry where skilled or unskilled labor is employed, the worker gets a fair reward; for the labor market of California has never yet been fully supplied. Owing to the salubrity of the climate a man can work more days in the year and accomplish more in a given number of days than in any other place, for the heat is never oppressive and the cold is never severe.

And if he can work here more days than elsewhere, he necessarily receives more wages, because the employer can afford to purchase labor the year around if the work can be well done and seasonably done, in winter as well as in summer. There is nothing in the climate of California to prohibit even farm work from being done during all the winter months.

Then we submit that as steady employment is of the first importance to the man who must work even at the wages paid elsewhere, he can earn more and save more here.

The bricklayer in California can work at his trade at least ten months in the year; the plasterer can work every day in the year; cold weather never impedes or interferes with the exercise of his trade. The carpenters and builders construct houses in all of our cities and towns the year around, and although during the rainy season they may be obliged to stop work for a week at a time (if the building is not inclosed), yet, as a rule, building goes on in California from one year's end to the other without any permanent or marked intermission.

The farmer in California commences plowing the moment the rain falls, say in November, and plows and sows until his grain is all in, say in February. Then if he has a vineyard or an orchard, he commences to prune and cultivate, and continues to plow and cultivate them until about the time haying and harvesting begin, which is in May of each year. From that time on he harvests his grain until the last of October. Rain never injures his crop or stops his work.

It will thus be observed that the laborer who does any portion of his work outdoors has more time to do it in California than in any other part of the United States. That the farmer has more time to sow his grain and a longer time to securely harvest it than in any other place in the world. This is attributable to the fact that we have no severe winters or heavy frosts, and that the summer is rainless and warm with cool nights. To be exact, our winter is simply a rainstorm and our summer is rainless.

## Wages.

The wages of unskilled farm-hands in California is from \$20 to \$30 a month. The average wages is \$1 a day and board. This includes ten months of the year. The other two months of the year during the harvesting the same man gets from \$1.50 to \$2.50 a day and board.

Lumbermen and loggers receive from \$40 to \$90 a month and board, depending on what they do. Mechanics in every branch of skilled labor receive in California from \$3 to \$6 a day.

I have been informed by the officers in charge of the railroad work shops at Sacramento, where nearly 2000 men are employed, that the mechanics there receive from \$3 to \$5 a day, depending on the department they work in and their ability to do.

It is stated by the heads of the Educational Departments in this State that the average salaries paid female teachers throughout the State is from \$60 to \$85 per month. As a rule they board themselves. Girls as house-servants receive from \$20 to \$30 a month and board. Good teamsters are never paid less than from \$25 to \$40 a month. And the demand for all of the above classes of labor has never yet been fully met.

## Price of Labor East.

The most instructive lessons as to the advantages of our State over any other State of the Union, relative to the labor question, can be obtained by comparing the prices paid for labor in other States of the Union with the prices here, the amount of time in each year that the laborer here and there can work, the opportunities to get work in the two sections and the prices paid for living here and there.

In New York, Boston and Philadelphia, wages of skilled laborers in all the various trades practiced in these cities average from 10 to 35 per cent less than they do in California, and except only in large factories these skilled laborers cannot get work at their trades but a part of the year.

It was officially reported by the heads of some of the industrial societies in the East that carpenters did not average to work more than seven or eight months of the year; plasterers

not over six months of the year; bricklayers not to exceed six or seven months of the year, and it is a well-known fact that farm hands only get employment, as a rule, from six to eight months of the year.

We learn from official sources that in all the great Central and Northern States of the Union, farm laborers receive not to exceed from \$14 to \$20 a month for a term of six to eight months of the year. In the Southern States labor is not near so high. Female house-servants get from \$8 to \$12 a month in New York, Boston and Philadelphia, and female school-teachers throughout New England and the Central States of the Union receive only from \$16 to \$50 a month, and that for but a part of the year. Not one of the above list of toilers has continuous employment except the house-servants.

There is a large class of people working in factories in New England, New York and Pennsylvania, who mostly work by the piece, and who have continuous employment, but they labor for such small wages that continuous employment only serves to give them continuous bread.

## Cheap Living.

California is especially a food-producing country. The supply of all the breadstuffs, fruits, meats and fish far exceeds the demand. The result is that all the foods are cheaper in San Francisco by from 10 to 50 per cent than in any seaport town of the United States.

Good meats are cheaper in San Francisco, according to the published schedules of prices, than they are in New York by 30 per cent. Fruits are cheaper in San Francisco than anywhere in any of the large cities of the Eastern States by over 50 per cent. And so along the entire list of what man eats, California furnishes the necessities of life cheaper than any other State of the Union, excepting possibly Oregon.

To show the condition of the laboring classes of California, we refer to the report of the Bank Commissioners of this State, in which it appears there are on deposit in the banks of savings of California, sixty-two millions of dollars. The population of our State at this time does not exceed 1,150,000. The population of the whole Union has been estimated at 65,000,000 of people. By returns from the proper authorities it appears there are less than \$1,200,000,000 in all of the savings banks of our country. It will thus be seen that California has one-twentieth of all the money deposited in the savings banks in the country, and yet our population is only about one-fifty-sixth of the population of the whole nation. And although this is a new country, and isolated from the great populous and monetary centers of the world, yet our laboring people—those who make deposits in savings banks and who live by their toil—are better off by a vast percentage than any other like number of people in the United States or in the world.

Our products here are so varied, and the lines of labor so many, that the opportunities for every man and woman who wishes to toil to get remunerative employment surpass any other place within our knowledge.

In this connection, and to add to what has been already said, we may observe that as grain is sown at a different season in this State than in any other State in the Union, and that harvesting continues for a much longer period here than elsewhere, the interval between the sowing of the grain and the harvesting of it is so large that the intermediate time is filled up and more than filled up by the use of labor in the great and growing industry of horticulture and viticulture.

To repeat, our grain-fields are sown and cultivated in the winter months. Our orchards and vineyards are cultivated during the months of March, April and May. Our harvesting and haying are done chiefly during the months of June, July and August, while our vintage is carried on during the months of September and October.

Thus every hour may be well employed, and for these reasons. There is not a day in the year when there is not a demand for farm labor, and this demand is increasing most rapidly. The unquestioned salubrity of our climate and our freedom from malarial diseases gives to the laboring man a greater certainty and stronger probability of continued health and the physical ability to work than in any other place. Add the further fact that men of families require less fuel here to supply their homes and less clothing to secure warmth to their children, makes California the most attractive place on the face of the globe for a poor man to live in.

Our productions are so varied, the establishment of new industries is so rapidly increasing, that the chances for a poor man to establish a business for himself and his family are greater here than in most countries. For be it known that the public lands of this nation are nearly all occupied, so that now when one undertakes to make a home of his own, or build up a business for himself, he must do it outside of the generosity of the nation or the liberality of the land laws of the country.

The great ranches of California are now being divided up and sold in small parcels, and on long time and liberal terms, so that men of small means can find favorable investments for the little they now have, and for the accumulations they hope to have in the future. Small fruit farms pay in California because more fruit, and as a rule better fruit, is produced from the same amount of land here, and by a like amount of labor than anywhere else.

In conclusion we say: If a genial climate, a

fertile soil, sunny skies, a balmy, health-giving atmosphere, and scenery of unsurpassed beauty are useful and attractive to any man, they ought to be to the man who lives in their presence, he who toils.

M. M. ESTEE, Chairman.

## January Weather for Nine Years.

Sergeant J. A. Barwick, U. S. Signal Service Observer at Sacramento, has issued an interesting report on January weather since 1880 at the State Capital, which we quote as follows:

The average monthly mean temperature for January, 1888, was 42.8°. The normal or mean average for 34 years was 47.0°, showing this month to have been 4.2° colder than the average of many years—in fact, a monthly mean temperature of 42.8° for January has never occurred here before this month. The lowest mean before was 43° in January, 1854, which was the coldest month of that name, with the exception of this one, ever known here since records were kept. The lowest temperature recorded here in 1854 was 19° at 8 A. M., by Dr. Legan, although other thermometers indicated 17°. This month it was 19° by the Signal Service, 18.75° by Captain Foster, Eleventh and F streets, and 16° by S. H. Gerrish, at 1817 G street. Signal Service and Captain Foster's thermometers were Green's standard self-registering, and Mr. Gerrish's was Sike's self-registering thermometer. The average lowest then was 17.8°, or about 18°. There was snow on the 4th and 5th and 16th. Signal Service measurements were 1½ inches on the 4th, and 2½ inches (unmelted) on the 5th, and a trace on the 16th. Mr. Gerrish's measurements were: on the 4th, 2.89 inches; on the 5th, 3 inches, making a total of 5.89 inches, as against 4 inches by Signal Service measurement. A trace also on the 16th.

Snow has fallen before in January as follows, by S. H. Gerrish's records: January 29, 1862, 75 of an inch; January 12, 1868, 1.62 inches; Jan. 26, 1880, estimate about .25 of an inch—melted very nearly as fast as it fell. The rainfall and melted snow for this month, Signal Service records, was 4.81 inches. The average of many years is 3.78, showing this month to have been 1.03 inches in excess of the normal precipitation for January.

	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Mean barometer.....	30.16	30.15	30.14	30.17	30.16	30.15	30.10	30.10	30.13
Mean temperature.....	48.6	48.3	48.2	48.0	48.0	47.2	46.7	46.8	46.8
Mean relative humidity.....	81.0	80.3	80.2	80.0	80.0	79.2	78.7	78.8	78.8
Mean dew point.....	61.0	60.3	60.2	60.0	60.0	59.2	58.7	58.8	58.8
Highest temperature.....	58.0	58.0	58.0	58.0	58.0	57.2	56.7	56.8	56.8
Lowest temperature.....	35.0	35.0	35.0	35.0	35.0	34.2	33.7	33.8	33.8
Total rainfall.....	1.64	6.14	1.50	9.23	3.13	2.16	7.05	1.12	4.81
Prevailing wind.....	SE.	SE.	SE.	SE.	SE.	SE.	SE.	NW.	NW.
Maximum velocity.....	34	32	32	30	30	30	34	30	30
Minimum velocity.....	8	10	10	11	10	10	11	11	12
Total clear days.....	15	10	10	11	10	10	11	11	12
Total cloudy days.....	8	11	11	13	10	10	13	13	18
Total days of rain fall.....	7	11	11	13	10	10	13	13	18
Days rain fell, 27° below zero.....	16	9	2	11	9	0	4	9	12
Days rain fell, 32° below zero.....	1	0	0	0	0	0	0	0	0
Lowest river.....	18.1	16.0	17.0	15.2	17.8	20.6	25.0	18.0	19.5
Monthly range.....	3.8	10.0	11.0	4.1	8.1	6.5	8.6	4.2	9.1

SUMMARY FOR JANUARY, 1888: Daily average temperature for the month, at 4 A. M., 38.8; at 12 M., 45.5; at 7 P. M., 44.1; monthly average, 42.8; highest and lowest temperature for the month, at 4 A. M., 54 and 21°; at 12 M., 60 and 30°; at 7 P. M., 57 and 31°; highest and lowest temperature for the month, 63° on the 25th and 19° on the 14th and 15th; average hourly velocity and prevailing direction of the wind for the month, at 4 A. M., was 4.8 miles, from the north and southeast; at 12 M., 7.5 miles, from the north; at 7 P. M., 5.4 miles, from the southeast; prevailing direction for the month was equally divided between the north and southeast. The average maximum velocity and direction of the wind for the month, at 4 A. M., was 9.5 miles, from the north and southeast; at 12 M., 11.8 miles, from the north; at 7 P. M., 11.5 miles, from the north. Highest velocity for the month was 36 miles from the north; extreme velocity, 38 miles. There were 11 killing frosts and snow fell four days—4th, 5th, 16th and 17th.

SEARGEANT J. A. BARWICK,  
Observer Signal Corps, Sacramento, Cal.

PRESIDENT AGASSIZ has decided to send 25 tons of concentrated ammonia down the burning shafts of the Calumet and Hecla mines at once, to put out the fire completely if possible.

## Academy of Sciences.

At the regular meeting of the California Academy of Sciences on Monday Feb. 6th, President Harkness occupied the chair. Gilbert Palache was proposed for resident membership. H. W. Turner of the United States Geological Survey presented the academy with six cases of insects, most of them mounted. Lucien M. Underwood also made a donation of the first and second decades of his *Hepatica Americana*. A magnificent collection of 1000 varieties of foreign and native flora was presented by Prof. R. A. Philippe of Santiago, Chili, who has been for some years an honorary member of the society.

A resolution was presented by Joseph D. Redding, expressing the desire of the academy that Mount Shasta and the vicinity as far as the McCloud river be reserved as a National California park. The resolution was unanimously passed.

Mrs. Currau and Drs. Behr and Hewston were appointed a committee to draft suitable resolutions expressive of the regret of the academy at the death of Dr. Asa Gray, the eminent botanist.

Frederick Gutzkow read a paper on "A New Method of Quantitative Determination of Bromine in Sea-water." The subject was exemplified by illustrative experiments.

HOWARD-STREET CABLE.—"Early in the spring" is the way that the officers of the Omnibus Railroad line express themselves as to the time that the work of converting the Howard-street branch of the horse line into a cable line will be commenced. Ground will be broken about the latter part of March and the cable line will take the same course as the present line, being a double-track road from the ferry slips to Twenty-sixth street. The roadbed will be constructed in the same substantial manner as the Market, Geary and California street roads, being of concrete with strong iron trackchairs. There will be no change in the width of the present track. The company has experienced considerable difficulty in procuring a proper site for an engine-house. They finally bought a piece of property on the northeast corner of Tenth and Howard streets. The engine-house to be constructed will be one of the best in the city and the machinery will be of the most modern manufacture.

A MINER'S DEATH.—On the 4th inst. Thos. Baker, a miner employed in the Kentucky mine at Gold Hill, Nev., was instantly killed. The shaft to which he belonged had just been relieved and Baker, with several other miners, had reached the surface. The cage in which they ascended was raised a few feet above the top of the shaft in hoisting. Before it was landed in the shafts Baker leaped from the cage-deck to the hoisting-works floor, striking his feet on the iron switch-plate in front of the shaft. He slipped, and in falling turned, and in scrambling to regain his feet plunged head first down the shaft to the sump at the bottom, a depth of 700 feet. His dead body, with the head nearly severed from the trunk and otherwise frightfully mangled, was brought to the surface on a cage a few minutes later. Deceased was an American, 35 years of age, and unmarried.

A BIG TREE.—We are advised by a party who saw the forest monster after it had fallen, that the largest redwood tree ever cut on the Pacific Lumber Co.'s possession was felled one day last week by Geo. McFaul and Mincey. The tree, which was irregular in shape at the butt, measured 16 feet in diameter one way, and 20 feet in diameter the other, at the stump. It was 200 feet long and tapered to 8 feet in diameter at the top. The tree was perfectly sound and without a limb. When manufactured, that tree would furnish lumber enough to build a small Mexican town.—*Humboldt Standard*.

THE mining companies upon the Comstock lode and in its vicinity disbursed a total of \$259,908 to employes during the month of January. The pay-roll of the Con. Cal. and Virginia amounted to \$49,351; Carson River mills, \$25,000; Water Company, \$25,000; Yellow Jacket, \$20,500; Savage, \$14,441; Hsie and Norcross, \$9155; California mill, \$11,441; Chollar, \$10,170; Potosi, \$10,024; Gould and Curry, \$8595; Crown Point, \$7700; Baltimore, \$7500; Alta mine and mill, \$6150; Ophir, \$4446; Sierra Nevada, \$3290; Mexican, \$1025; Union Con., \$969; Utah Con., \$3150; Nevada mill, \$2512.

ELECTRIC LIGHTS ON FERRY BOATS.—Arrangements are being made for the introduction of the incandescent light system on the ferry steamers between San Francisco and Oakland. The lights will first be placed in the Piedmont. A small dynamo will be operated by motive-power furnished by the engine, from which 135 lights will be distributed about the craft. Along the center of the saloon a row of 20-candle power lights will be placed, while those about the sides will be 16-candle power, making the interior as bright as day.

THE Northern Pacific has received the new rotary "snow-eaters," which are to supersede the old-fashioned snow-plows. The company has purchased three of the machines for use on the western end of the line—two on the Cascade division and one on the Rocky Mountain division. Superintendent Gilbert says they work like a charm.





A. T. DEWEY.

W. B. EWER.

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SAN FRANCISCO

Saturday Morning, Feb. 18, 1888.

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## Passing Events.

The mining convention at Helena, M. T., to consider the question of preventing railway companies obtaining mineral lands on their patents is a very important move for miners. There has been so much of this sort of thing in the past that it is high time active steps were taken to prevent it in the future.

The question of allowing miners to take up mineral land in Indian reservations is about to come up in Congress. It has been one of the grievances of the mining community that so much mineral land has been lying dormant in reservations, and that it cannot, under present laws, be utilized.

New coal-fields are about to be opened on the northern coast, and active prospecting for coal is going on in all directions, owing to the high prices of fuel.

More of the copper mines in this State and Nevada are being opened than for years. The fact that copper is likely to remain at high prices for some time has encouraged the owners of these properties.

THERE is some talk that the Esmeralda Copper Company will start its furnace at Sodaville, Nev., soon. The works have been idle for a long time, and now that copper has taken a raise it would be profitable to that company to resume operations.

## Public Astronomical Observatories.

In conversation the other day with Alvan G. Clark, the famous telescope-maker, who has since returned to his home in the East, he remarked to the editor of the Press that the idea of the Chahot Observatory of Oakland was a wonderful one. The fact of its being open to the public nearly every night in the week was a new idea. He has seen observatories all over the world, but none conducted on this plan. He says New York, Boston, and other large cities would do well to follow Oakland's example in this respect. Of course he realizes that those in charge can do little scientific or theoretical work in such an observatory, but still numbers of people are being educated to an understanding of astronomical matters. He thinks too many persons consider astronomy abstruse and difficult, and that they imagine the whole subject as only one that can be appreciated by those of great knowledge of higher mathematics. "But," says Mr. Clark, "the best astronomers are not always the best mathematicians by any means."

Mr. Clark realizes, of course, that the observers at the Lick Observatory could not do very much work if visitors were at liberty to come and go as they please. But he is of the opinion that it is a good thing to have such institutions as the Chahot Observatory, where any citizen may have an "evening with the stars" and learn something of the working of telescopes, transit, time-clocks, etc.

The Chahot Observatory was given by the public spirited citizen whose name it bears to the public schools of Oakland as an educational institution. It was not intended as a place for scientific research, but to teach the pupils of the schools something about astronomy and astronomical instruments. The Board of Education of that city, in whose care it is, pay competent young men to stay at this observatory every evening, receive the parties who come, show them the instruments and give them an opportunity for an observation. The director of the observatory is the Oakland Superintendent of Schools, Mr. Fred M. Campbell, and the assistants in charge are Messrs. Burckhalter and Hill.

By application at the rooms of the Board of Education, a card is given to the applicant for a certain night, and the date of the expected visitor is properly registered. It is customary to make up small parties to make the visit, one card admitting the party. As a general thing, the evenings are engaged about three months in advance, which shows the popularity of the plan and the observatory. The visitor must take the chances on the character of the night specified. If it is foggy, he cannot come the next night, for that is engaged by others, but he must take his place at the end of the list.

The young gentlemen who receive these parties are, of course, enabled while observations are being made to impart much useful information and answer the many questions propounded by the curious or uninformed. By means of the transit, clocks and electrical apparatus, correct time is obtained and the city clocks regulated. The noon and curfew bells are also rung with great exactness from this observatory, connections having recently been made for this purpose.

The classes in the public schools have certain nights set apart for their convenience. Pupils of private institutions can also avail themselves of the observatory, and the public at large are welcome, providing they comply with the regulations as to registering. There is no red tape about the observatory, its affairs being conducted with great simplicity for a public institution. The founder of the observatory, recently deceased, left an additional \$10,000 to further perfect the institution.

Mr. Clark's remark that such an observatory would be of great value in other cities was a practical one. He could realize the use it would be in interesting and educating the public. That it attracted his attention is noteworthy, and, no doubt, he will frequently refer to it elsewhere. We should not be surprised to see the example followed in several other cities within the next few years.

THE jute-mills at Oakland now employ 250 whites and 100 Chinese. Very few of the skilled jute-workers who came from Scotland are now at these mills.

## The Magnetic Variation on the Pacific Coast.

In our edition of January 28th we made incidental reference to the discovery of recorded observations of the magnetic variation off and along the coast of Lower California and part of the eastern coast of the Gulf of California.

Since the article was published, Assistant Schott, in charge of the computing division of the Coast Survey, has made a special report upon the subject, and as the observations of 1714 very materially influence the formulae for computing the magnetic variation as far north as Monterey, we present extracts from this report.

The discovery of records of the magnetic declination A. D. 1714 off the coast of Mexico by Assistant George Davidson, and transmitted by him to this office, proved to be a matter of much importance by greatly increasing our knowledge of the secular variation of the declination.

By means of these observations I was able to improve materially the expressions for San Blas and Magdalena bay, to add the new station Cape San Lucas, and to make their influence felt as far north as San Diego and Santa Barbara. It is the range which is greatly improved, and, moreover, the epoch of maximum declination is shifted in the right direction.

Apart from the fact that a region of west declination is here for the first time observationally indicated on the Pacific Coast, the power of the newly recovered declinations is due to the circumstance that, as far as known, they cover a time when the needle was in or near a phase the opposite of the present one. \* \* \*

These early observations have given great weight to the correctness, or rather the applicability, of the derived expressions, to the whole period of time which the observations cover, 174 years.

The rediscussion with these observations has changed the epoch of the Eastern maximum of declination, so that now we are satisfied that for the following places the epochs are San Blas 1856, Cape San Lucas 1873, Magdalena bay 1875, San Diego 1883, Santa Barbara 1880, Monterey 1899. The easterly variation is therefore decreasing for all the stations except Monterey, and the rates of change are as follows:

San Blas 1885 decreasing yearly 2'.9, in 1890 3'.3; Cape San Lucas 1885 decreasing yearly 1'.2, in 1890, 1'.6; Magdalena bay 1885 decreasing yearly 1'.0, in 1890, 1'.4; San Diego 1885 decreasing yearly 0'.1, in 1890, 0'.4; Santa Barbara decreasing 1885 yearly 0'.4; in 1890, 0'.7; Monterey 1885 increasing yearly 0'.9, in 1890, 0'.6.

The expressions for the computation of the magnetic declination at the foregoing stations slightly changed, but for San Francisco it remains as we gave it.

In addition to these recovered magnetic observations, Professor Davidson has just discovered still more ancient records reaching back to the time of Drake and Cavendish, and extending from the northern limit of Drake's track off the coast of Oregon to the latitude of Acapulco, together with two very important observations in the West Indies.

## Foreign Miners in the Territories.

The amendment to the Alien Land law introduced by Senator Hearst, and to which we have before referred, has been discussed in the Senate. It allows foreign corporations to purchase and hold mining properties in the Territories. During the discussion, which was participated in by the Western Senators, it was urged that the measure was an absolute necessity, if the territorial mining properties were to be developed. This is well understood by any one who is familiar with the situation in the mining Territories. The big English companies have benefited every camp they have ever taken hold of. They put up large works, develop their mines for what there is in them, and employ thousands of miners. It is very probable the bill will pass.

An amendment was offered by Senator Mitchell and adopted, excluding Chinese corporations from the benefits of the bill. This will please some mining communities, but will not suit all owners of mining ground. In this State worked and surface claims are sold to Chinese who make money out of them. And this is

done in other places where there is surface ground to be mined. The Chinese do not take to quartz mining much on their own account. But the law does not apply to States in any particular, the Territories only being affected. There are some kinds of ground that only Chinese will undertake to work; but the miners generally, throughout the country, do not care to have them in the camps if it can be helped.

## Land Patents Cover Minerals.

People interested in the reservation of mineral lands should remember that it is very difficult to invalidate a patent when it has once issued to an individual or a railroad company. In a letter written by the Secretary of the Interior to the Commissioner of the Land Office, some time since, he says: "The statutory exception of mineral lands from the grant to the railroad companies is construed to include only lands known to contain valuable minerals prior to the issuance of the patent. The railroad company will therefore get a patent to all lands to which it is entitled, including mineral land, unless the Government is apprised of their character."

In an article in another column further remarks are made on this subject. It is unfortunate that so much mineral land has gone into private hands by the means described. At the mining convention, at Helena, Montana, Mr. O'Bannon of Deer Lodge spoke concerning the action of the N. P. R. R. and cited instances of large tracts in Deer Lodge county, where there were as high as 900 locations on a section, and it could be sold within a week for half a million dollars; and all this had been certified to as non-mineral land. An instance was recited where Patrick Cahalin had purchased a tract of land at the mouth of the Big Blackfoot and paid a big price for it. He afterward learned that there had been a previous location as mineral land, and that it was subject to relocation. He then wrote to the N. P. Company to protect him. The answer was that the best thing he could do was to locate it, and then have a good title and an N. P. title, and thus be secure.

Such things as these are outrageous. It is not the policy of the people of the United States to permit it, but the method of carrying out the laws is defective. We see now that in view of the great opposition to the issuance of the patents to the N. P. R. R., Government has sent out an expert to see if mineral land is being covered. Why should not Government be compelled to do this in all cases? The system might be abused, but it is much better than that now in vogue. Mineral lands are too valuable to be given to companies and individuals in large tracts, such as they get under the present system of land patents. The present move of the Montana people will have the effect of calling official attention to the matter in a way that cannot be ignored.

## The Rae Process at the Pan-Mill.

Mr. Mackey's California pan-mill on the Comstock has had one side fitted up for the Rae electric process in order to give it a thorough test. During the last month before shutting down, in a run of 22 days this process has effected a saving of 1760 pounds of quicksilver. It is said also that the magnetism has so affected the other side that a saving of five per cent is shown. Only half the mill is run with this process, and the saving shown is as compared with the corresponding other half of the mill not using the process. The run was not steady, there being considerable difficulty with the ropes of the motive-power, and the mill is now shut down while necessary changes are being made.

We are informed the management is satisfied that with a steady, uninterrupted run, the process will do a great deal better. Methods are to be adopted, also, so as to better influence the amalgamation as well as to save the quicksilver.

The tests which will be made of this process during the next run will be crucial. The appliances are all perfect and well made. By having one-half the mill running with the Rae process, and the other half without, a good basis of comparison can be had. The process has been so satisfactory elsewhere that its friends are confident it will effect all that is expected at this important mill.



## Mineral Lands.

As was recently remarked in the PRESS, by the loose method of carrying out our land laws, much of the mineral land of the United States has been taken up as agricultural. Once the patent for land has issued there is no redress. The patent carries the minerals as well as the land itself. The trouble is that the required "proof of non-mineral character of land" is only negative. That is, the claimant has not got to prove that there is no mineral; he simply says that to the best of his knowledge and belief there is none. Some one has got to go and protest, and then prove there is mineral in the land, in order to prevent a patenting. Now the man who has to prove that there is mineral has no interest in the subject at all, unless he has already discovered mineral. Three or four agriculturists, who do not know mineral when they see it, testify as to the agricultural character of the land, and so the patent issues. A good deal of this sort of thing has been done all over this coast, sometimes through ignorance, and sometimes through design.

But this taking up of mineral lands has not been done entirely by individuals. Of course the railroad grants generally except the minerals, but sometimes the patents issue before the mineral character of the land is determined. They are having trouble of this kind up in Montana, but the people there are alive to the fact that injustice may be done, and are taking steps to prevent the mineral-bearing regions from being taken up.

A meeting was held last week at Helena, M. T. The meeting was called to take action upon the attitude of the Northern Pacific railroad on the acquisition of public lands in Montana under their land grant. The grant excepts all mineral lands save those bearing coal and iron. Through ignorance or carelessness on the part of the Government surveyors much mineral land has been reported to the department as non-mineral land. It has been ascertained that the Northern Pacific railroad has had certified to it for patents a large amount of mineral lands under the representation of such surveyors that they were non-mineral in character. The convention was called to protect against the issuance of patents to the railroad company to lands which are not absolutely known to be non-mineral bearing. Memorials to Congress and the President were adopted. Proofs of the mineral character of the mountainous lands of Montana will be forwarded to Washington at once.

## Mines on Indian Reservations.

Representative Hermann has introduced a bill in the House for the disposal or sale of mineral land on Indian reservations, and also providing that timber on such reservations may be used for mining purposes when a compensation has been made. There will probably be considerable opposition to this bill from those persons who think the Indians should not be interfered with. The Indians themselves decidedly object to miners coming on to the reservations to prospect, for they know that when mines are discovered numbers of white men come. They are afraid that in such cases they will have to move elsewhere before the restless march of civilization. And it is pretty much so, to speak truly. A few groups of rich mines in a reservation would change the condition of affairs materially.

Yet the miners argue that there are large tracts of mineral lands on some of the reservations which are no good to the Indians and which should be utilized by the whites. They say that the working of the mines will not interfere with the hunting and fishing of the Indians, and will in no way injure the reservation.

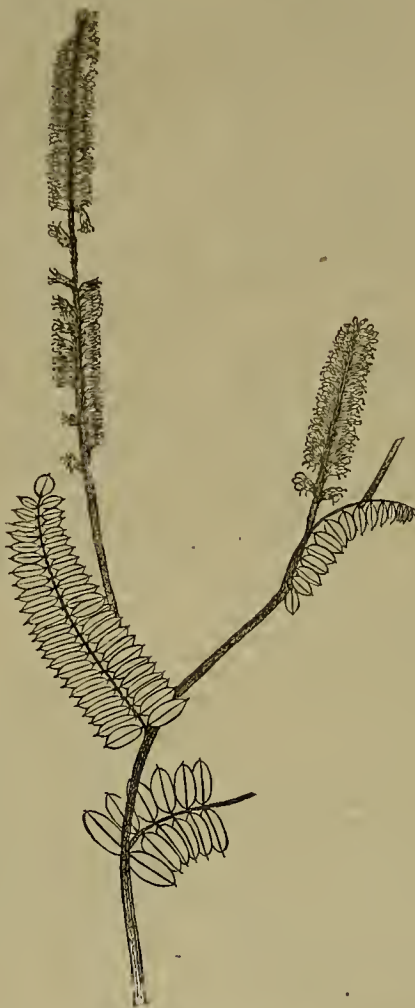
It is known that there are mineral deposits on several Indian reservations of the West, and in some instances the authorities have had great difficulty in keeping prospectors and miners off. The discussion of Mr. Hermann's bill will no doubt bring up the old question of separate reservations or one great region in which all Indians shall be kept; and the fact that the question of admitting miners on reservations to work mines is being talked of will make them all the more eager to obtain the privilege.

The Idaho Mining Company of Grass Valley has paid in dividends, up to January 1, 1888, \$4,593,750.

## Hints to Prospectors.

## Plant Indicating Presence of Lead.

In the PRESS of last week were given some extracts from a paper by R. W. Raymond, concerning the existence of certain plants which indicated the presence of certain minerals in the soil. We gave an illustration of the *viola calaminaria* which has been found to indicate the presence of zinc. To this indicative plant may be added the "lead plant," *Amorpha Canadensis*. An engraving of this is given on this page, the drawing being of natural size, made from a specimen in the Columbia College herbarium. It is a low shrub, from one to three feet high, whitened with hoary down. Its leaves are very numerous and spring directly from the stem without foot-stalks. The leaflets, arranged in 15 to 25 pairs, are crowded, small and elliptical, with sharp, spiny terminals. Their upper surface becomes smooth



THE LEAD PLANT.

with age. The flowers are aggregated in spikes, the individual blossom being almost without foot-stalks.

The calyx-teeth are rather long, equal, and in shape between an egg and a lance-head (ovate-lanceolate). The color of the vexillum or upper petal is light blue. The plant is most abundant in Michigan, Wisconsin and Illinois, and ranges southwesterly. Descriptions of it may be found in Torrey and Gray's *Flora of North America*, vol. i., p. 306, and in Gray's *Manual*, 5th ed., p. 130. The name "lead-plant," locally given to it, expresses the belief of the miners that it indicates the presence of lead ore in the soil, or at least flourishes best where such ores exist. It is followed as a guide by prospectors in looking for the deposits of galena in limestone which characterize the region named, and which, as is well known, are scattered and irregular, and usually have no outcrops.

Another indicative plant has been reported to Mr. Raymond since his paper was presented, by Dr. F. Stapf, now of Berlin, who writes that, some years ago, during a visit to the neighborhood of Caeres, Estremadura, Spain, he was surprised by the skill with which the native prospectors located, in spite of surface gravel, the underlying outcrops of phosphorite. It is not easy to recognize scattered and more or less decomposed fragments of this mineral, particularly when sparsely distributed in the

debris of the silurian slates and the Devonian dolomite, along the contact of which it occurs. On inquiring whether any peculiar vegetation indicated its locality, Dr. Stapf was told that a creeping plant with bell-shaped flowers frequently, if not invariably, marked the spot. He collected specimens of this plant, growing along the contact referred to, but preferring apparently the slates between the Esmeralda and the Salvador mines, in the district named; and although flowers could not be obtained (it was in April, 1884), Prof. Ascherson of Berlin easily recognized it as *Convolvulus althaeoides*, a plant which is not uncommon in the northern parts of Africa and the southern parts of Spain, where it grows on limestone or even on sand.

## Cable Railway Patents.

A very important patent suit has just been decided in the Circuit Court of the United

States for the Southern District of New York. The Brooklyn bridge trustees have been using the Hallidie patents on the cable railway on the bridge. The National Cable Railway Co., who, in conjunction with the Pacific Cable Railway Co., own all the "bottoms" patents on the cable railway system, sued the bridge trustees. The decision has been rendered in which it is decreed that the re-issue letters patent granted to A. S. Hallidie, No. 7607, dated April 17, 1877, are good and valid, and that the title thereto is duly invested in the National Cable Railway Co.

It is further decreed that the bridge trustees have violated and infringed the exclusive right of the National Cable Railway Co., under these letters patent. The sum of \$4500 is awarded as damages for the infringement. "And it is further ordered, adjudged and decreed that a perpetual injunction issue under the seal of the Court, enjoining and restraining the said defendants from making or using said patented improvement during the term of said letters patent."

This decision is an important one, but was only to be expected. Several of the roads built in the East have endeavored to evade this and other patents. In doing so they have tried all sorts of impracticable plans and made many failures. Then, when they did adopt something practical, they infringed patents which had originated in San Francisco, where the cable

system is the most complete and perfect. The roads which have been built of late, however, have mainly purchased rights from one of the large companies mentioned, which, as stated, now own all the important patents.

## Foundry Notes.

The large-sized dredger built by the Golden State and Miners' Iron Works, is at work throwing up a levee on Ryer island from the bottom of the river. It makes about one and one-half miles of levee a month. This dredger has a hull 40x80 feet, with three spuds, raised or lowered by a donkey engine. The swinging boom is 105 feet long and the shears 50 feet, allowing the bucket to work to advantage at a depth of 35 feet. The bucket has a capacity of one and one-half to one and three-quarters cubic yards. The engines are 200-horse power. This dredger is the property of Reclamation District No. 501, and is run by two crews of four men each, day and night shifts, at an expense of \$1000 a month. About three miles of levee have been built. The whole distance around Ryer island is 22 miles, and upon its first round the dredger will put up a levee about six feet high with a 40 foot base to connect with the few miles of levee already laid up. The completed levee will be 12 feet high and 70 feet at base. Ryer island is north and west of Grand island, 30 miles below Sacramento, and is bounded by the west branch of the Sacramento river or Steamboat slough, Cache slough, Miner slough and Sutter slough. The Golden State and Miners' Works have made a specialty of dredgers, and all they have built do remarkably good work.

The scow Dayton, 80 feet in length and 30 feet in width, built for the use of the Carson River Dredging Company, was launched the other day. She will be equipped with steam machinery for dredging the river-bed to recover amalgam and quicksilver which has escaped from amalgamating pans in the stamp-mills, the value of which deposit in the river-bed is estimated at \$50,000,000. The steam dredging machinery is being constructed at the Pacific Iron Works in this city and is nearly completed.

It is expected that the cruiser Charleston will be completed by next September, or at the latest by October. By the terms of the contract with the Government, she should have been finished in August, but owing to the delay in procuring steel for her plates, it is considered impossible to have her ready at the time called for in the contract. Her engines are all completed and ready to be put into position at any time. About 600 men are at work on her at the yards of the Union Iron Works.

The new steam schooner Noyo was satisfactorily tested on the bay this week. Her engines, which are triple compound of 400 effective horse-power, were built by Hinkley, Spiers & Hayes. She has two high-pressure cylinders of 10 inches in diameter, one intermediate of 22 inches and one low pressure of 36 inches in diameter; the diameter of the propeller is 10 feet. She has steel boilers and two corrugated steel furnaces.

In a recent lecture by R. W. Raymond, secretary of the American Institute of Mining Engineers, he makes the statement that a detailed analysis of the pay-rolls of the Lehigh Coal Company for the 18 months from Jan. 1, 1886, to June 30, 1887, shows that every miner, good, bad or indifferent, skilled or unskilled, working by contract for the company during that period averaged \$2.72 for every day worked.

OWING to the publicity given of several rich strikes in various parts of New Mexico, a mining boom has taken possession of the people. In the past two months it is estimated that nearly 4000 locations have been made in the various mining districts of New Mexico, principally, however, in the southern part of the Territory.

THE SAN FRANCISCO MINING AND SCIENTIFIC PRESS has just published its annual mining review (a good one as usual), in which it makes liberal quotations from the *Courier*.—*Prescott (Arizona) Courier*.

THE water in the Carson river continues to rise, although there is no boom as yet, and none is desired. All the mills are running on full time and to full capacity.



## MECHANICAL PROGRESS.

## An Anti-Gas Acid-Resisting Alloy.

The *Engineering and Mining Journal* contains an interesting illustrated article on old Roman mining machinery, which were taken out of the Rio Tinto Company's mines in Spain. These mines, as is well known, were worked by the Romans and formed one of their principal sources of supply of copper 2000 years ago. The illustration represents a water-wheel which was unearthed on reopening an old part of the workings which caved in about 1500 years ago, and shows one of the methods adopted in those primitive times to mine their deep workings. The wheel is 14½ feet in diameter, and is one of many uncovered at various depths. The particular one photographed was found at a depth of 407 feet below the surface. It was made entirely of wood, put together with keys and pegs, the only pieces of metal about it being the axle, which is a shaft of bronzes about 2 inches in diameter and some 3½ feet long.

The most interesting thing connected with this find is the fact that the shaft was made from an alloy which had lain for all these centuries in water pregnant with sulphuric acid from the decomposing pyrites, but was entirely unaffected by its years of exposure beyond a slight film or coating of sulphate on the surface. When Mr. Ledoux saw the shaft last summer (it has since been presented to the British Museum), he was interested in ascertaining the character of a composition that could so successfully resist acids. It is an alloy practically containing, copper 90 per cent, lead 5 per cent, tin 5 per cent, there being just sufficient lead to form the coating of sulphate and prevent the further disintegration of the metal.

The water-wheel revolved in a pit, raising the water some 12 feet. At the point of discharge of the buckets a trough had been apparently located leading the water to another pit, whence it was raised by a similar contrivance and so on to the surface. The motive-power was furnished by slaves, who stood upon the wheel grasping ropes with each hand to steady themselves (the casts of these ropes in some instances have been found in the debris above the wheels), showing that these slaves worked the wheels in tread-mill fashion, stepping upon the projecting ends of the spokes or braces, which gave them a step about six inches wide by one inch high.

## Decomposition of Boiler Iron.

There is no one thing in boiler practice that gives the conscientious engineer more anxiety and real concern than the effect of salts in water upon steam boilers. This trouble is always present, and cannot be eliminated in many cases only by the use of rain or distilled water.

A correspondent at Norristown, Pa., writes to a technical journal as follows: "I am an engineer, and connected with a volunteer fire company who own a steam fire engine. It was placed in service Jan. 1, 1881, and on being inspected August, 1887, was found to be unserviceable or dangerous to use. The iron was 'pitted' or eaten full of holes all over, and half through the sheets; the tubes being copper, were in good condition. The shell and tube-sheets were of steel; tube-sheets ½ inch and shell 3-16 inch thick. We were compelled to have a new boiler built. We have other fire engines here that have been in service over 20 years, and they show no such action of the water upon them. If you desire further information as to water and conditions, will cheerfully furnish it."

Upon the above the editor remarks as follows: It is evident that the case described presents features that Colburn in *Transactions British Association*, 1884, describes as follows: "As a malady, corrosion corresponds in its comparative frequency and fatality to that great destroyer of life, consumption," and it has as many phases and periods of action. Corrosion is local and general, and is to be found in all boilers using water not chemically pure and on all iron exposed to air and moisture with carbonic acid.

It is evident that this is a case of "pitting," as it is called, and if other boilers using the same water do not groove or pit, we shall conclude that the cause was in the steel used. It may be possible that the metal used was impure, or had certain chemical qualities which furnished matter for the salts in solution or suspension in the water to feed on, or to attack, dissolve and thus leave cavities in the inner face of the metal. We have inspected several boilers that showed this action of water, and have been satisfied that the cause was with the metal.

A NINE-TON GUN CASTING.—The announcement is made from Pittsburgh that the nine-ton steel casting has been drawn from the sand, which, when bored and finished, it is hoped will demonstrate the practicability of making guns composed of a single steel casting, instead of building them up of a series of steel rings, shrunk on, in order to impart the necessary tension to the outer portions of the tube. So far as appearances go, the casting is pronounced to be perfect, but only the final test with powder and shot will determine whether or not the process is successful. If it proves to be so, then something of a revolution will probably take place in the manufacture of guns, because, by

this process, they can be made much cheaper, and the cost of killing people somewhat reduced. The gun will now be annealed and then bored. It will then be shipped to Washington, where it will be rifled and tested. In connection with the above we are told that the large guns, which it is proposed to make in this country, will be quite useless against recent armor plates. Says the *American Mechanic*: It is this old question of the irresistible force and the immovable body. The same question crops out in mechanics. A lathe or a planer is always wanted—and always will be—that will take a larger cut. So there will always be wanted a gun with more powers of penetration.

WELDING STEEL.—A correspondent of the *American Machinist* offers the following hints which he thinks may be of interest: All practical steel-workers know that with some kinds of steel it is very difficult to make a solid weld. In the first place, the two pieces of steel should be carefully scarfed, so that they will fit together well when taken on the anvil to weld, and, when practicable, a V scarf should be made, or, to make it plainer, split one end and point the other, and put together before they are put in the fire for the welding heat. This way of scarfing is much better, for, by so doing, the outside scarf can be hammered up close to the heel of the other scarf, so that dirt or small pieces of coal from the fire cannot get between the pieces of steel. I heat them slowly until they are an even cherry-red, then apply horax and bring the heat slowly up to pretty near a welding heat. Then take some soft iron filings and sprinkle over the steel where it is to be welded, put on more borax, if necessary, and bring it up to a welding heat. By the use of iron filings a much stronger weld can be obtained than by horax alone. I have tried several kinds of welding flux and other preparations for welding steel, but have never found anything so sure as wrought-iron filings and borax.

THE VALUE OF MILLING MACHINES is testified to by Mr. Jas. D. Hubbell of Cincinnati, who writes: "I want to state my experience with a gang of them used for milling joints for huggy tops. One set of mills last one month, making 600 joints per day, or 15,600 joints per month. Two machines mill the form, such machine milling half the circle, the third slotting the pieces, this being one-half the joint; then these machines make the other half only, the third machines cuts the tongue. One boy runs three machines and receives 15 cents per 100. The mills are sharpened once a week, costing 75 cents to sharpen. Then at the end of one month the mills are annealed and worked over. I have two sets of cutters that have been working this way for one year, making nearly 200,000 joints, or 400,000 good pieces, for there are two pieces to one joint, and, of course, there are some spoiled, which are not counted."

THE ENGLISH COPYING AMERICAN PRACTICE.—Recent designs of locomotives built in England and illustrated in English mechanical journals, says the *American Mechanic*, show a decided tendency toward American practice. One recently built for express and passenger service on the London & Southwestern railway, from the designs of the locomotive superintendent of that road, has a four-wheel truck, or bogie, in front, with outside cylinder, and has quite an Americanized appearance. There is no headlight to speak of, and no cab worth mentioning, but this latter feature is just perceptibly larger than they made them a few years ago, and perhaps indicates that they will eventually be made sufficiently large to constitute a shelter for the engineer worthy of the name.

MAKING CONICAL SPIRAL SPRINGS.—A correspondent of the *American Mechanic* says that a mechanic of Baltimore makes conical spiral springs in the following manner, with ease and facility: Wind the springs in the usual manner on a straight mandrel and close the ends back the distance required for the cone, by bending the coils in the jaws of a vise. Commence with the end coil and squeeze first on one side and then on the other, until it is somewhat reduced in size; then take the next coil, and so on as far as you want to go. Be careful to squeeze the coils in such a manner as to retain their circular form. It is a best, in order to get good results, to go over the cone a number of times instead of reducing each coil to the required size as you go along.

STEAM-ENGINE TESTS.—It seems impossible to conduct a series of steam-engine tests so as to give satisfaction in the results. Some time since we noted what appeared to be some remarkable results from the tests of small engines at a fair in England. Now we find that the accuracy of the methods employed in testing are questioned in such a way as to lead to the belief that the published results had no value.—*American Mechanic*.

THE CONSUMPTION OF POWER.—It has been ascertained that the horse-power required to run a machine shop, in which 700 men were employed, was 135.05, of which 66.81 horse-power was required to run the shattering, blowers, and such things as were not machine tools, leaving 68.24 horse-power to run the machine tools, or a trifle less than one horse-power for ten men.

## SCIENTIFIC PROGRESS.

## The Lore of Buried Cities.

An increasing degree of attention is being given to unearthing the remains of ancient cities. The results derived from these excavations are doing much to confirm the truths of recorded history and not unfrequently furnish new additions to facts and events previously known.

## The Buried City of Sybaris.

The statement that the Italian Government has decided to appropriate money for the excavation of the buried city of Sybaris will be received with pleasure by every one who remembers the valuable results which followed upon the unearthing of Pompeii. For Pompeii was after all but a village as compared with Sybaris. Making all due allowances for the exaggeration of ancient writers, says the exchange, the latter city was undoubtedly one of the wealthiest and most luxurious of which we have any record in the past. When the Cotronian army over 500 years before Christ vanquished its enervated populace, they turned the river Crasis upon its site with a view of wiping the town from the face of the earth. For 2400 years it has lain buried beneath the silt which the river deposited upon it. With the aid of the Athenians the survivors some years later founded the town of Thurii near the place, but from that day no trace of the buried city has ever been discovered. Doubtless the conquerors carried off with them many articles of golden and silver luxury, but there must yet remain countless art treasures gathered by a people who in their day were the business masters of a population numbering several millions. The faded beds of rose leaves have long since molded into dust, but there possibly exists many imperishable monuments of the cunning artificers whose skill in catering to the wealthy inhabitants has made the name of Sybarite synonymous with luxurious beauty.

## Prehistoric Central Africa.

Ruined and buried cities are now known to have existed near the central regions of Africa, of which the modern world has until quite recently had no knowledge whatever. The ruins of very ancient cities upon the seacoast just south of Zanzibar have of late been discovered.

The most indubitable evidence has recently been found that more than 2000 years ago there must have existed along the central portion of Eastern Africa a people who had advanced to a very high degree of civilization.

Some way south of Zambesi river there is a large region extending from the sea nearly 400 miles inland and 300 to 400 miles toward the south, in which ruins are constantly being discovered, proving that in prehistoric times the country was inhabited by a civilized people. To-day only the rudest black tribes inhabit this land, save in a few places where the Portuguese have established stations. The little beehive huts of the natives are seen among massive ruins, harkening a degree of architectural skill which rivals that of the ancient Aztecs. Our knowledge of these ruins is still far from perfect. Our earliest records of travel and trade on the East African coast, extending back to the beginning of the Christian era, do not mention them. Only in recent years have the travels of Selous, Erskine, Mauch, Baines, Mohr and O'Neill revealed to us the monumental evidence this country contains.

The coast town Sofala is shown on all maps of East Africa. Near that town Carl Manch found extensive ruins remarkable for their enduring nature and strange shapes. There are partly ruined walls, still 30 feet high and 12 feet wide at the base, built of small hewn blocks of granite. In these walls, sometimes 15 or 20 feet from the ground, are embedded one end of blocks of stone 18 to 20 feet long, which were evidently used to support galleries. Here and there, built in the walls or standing by themselves, are round stone towers which evidently rose to heights of 30 to 50 feet. Similar masses of masonry are found as far as 350 miles inland and a little north near the coast.

It is not positively known yet who built these ancient structures. No trained archaeologist has visited them, and no search has yet been made for inscriptions, though O'Neill says he has no doubt from what he has recently heard that there are numerous inscriptions on the ruins about Manica. All these ruins are surrounded by surface gold mines. It is believed that all this country was occupied some time before the Christian era by a great colony probably of Phœnician origin, and that its chief occupation was gold mining.

Mr. O'Neill says that these numerous ruins are nearly as well preserved as those of ancient Egypt, and better than those of Assyria. Some day, no doubt, they will be systematically studied. Their existence shows conclusively that a large region in inner Africa, now given up to savage men and wild beasts, was subject many centuries ago to the control of a people who were considerably advanced in the arts of civilization.

## Late Discoveries in Ancient Egypt.

Very important discoveries have been made during the past year among the ruins of the ancient cities of Egypt. The results of these explorations were recently recounted by M. Naville, the famous discoverer of the treasure city of Pithom in an address before the Society of Arts in London.

The excavations at Tel-el-Yahoudieh were designed chiefly to corroborate the account given

by Josephus of the construction of a Hebrew temple by Onias in the time of Ptolemy Philometer and his half-sister, Cleopatra. M. Naville's subsequent work at Bubastis, which was more successful, brought to light the columns and foundations of the great temple described by Herodotus as the most beautiful in Egypt. The ruins here were very ancient, columns with palm and lotus capitals pointing as far back as the twelfth dynasty. The oldest monument was a cartouche of Pepi I, a Pharaoh of the sixth dynasty of the remote pyramid period, and a very large number of most interesting inscriptions were disclosed. Only one-third of the work of turning the massive blocks of stone in the search for inscriptions was done.

These results, while tending to confirm the historical accuracy of Josephus and Herodotus rather than to throw light upon mooted problems of the Pentateuch, are of the highest archaeological importance and amply justify the recent appeals of the Egypt Exploration Society for financial aid in prosecuting the work.

## The Three Forces—Physical, Vital and Psychic.

[No. 16.]

[Written for the Press.]

In the lowest forms of animal life we find nothing answering to the brain as we know it in the higher forms; the circle of nervous filaments which surround the neck of the esophagus of the star-fish, and which contain but a few nerve cells, can scarcely be termed a brain proper; it, however, connects the nerves which belong to each ray, and hence is an indication of a system for combining movements which reaches its highest perfection in man.

The Nematoid worms, the larger parasitic ones at least, possess a nervous system slightly more compact, a larger number of ganglionic cells; and also from the papille, which have a tactile function and surround the mouth, are derived a few nerve fibers, a few groups of cells are also in close connection with these latter.

In the Nemertide, a marine worm, whose bodies are covered with cilia, and are very soft and contractile, there are two or more dark spots just behind the mouth which answer the purpose of rudimentary eyes or ocelli. A pear-shaped ganglion on each side of the animal's pharynx receives the nerves from each ocellus on its own side, and the two ganglia are connected by other fibers which pass some above, others below, the esophagus, thus forming a ring; from these also proceed the lateral nerve trunks which supply the muscles of its body. A large number of small nerve cells are in these pear-shaped ganglia, the whole being of a slight reddish or pink color.

In the earth-worm two upper ganglia supply the place of the lateral ganglia in the Nemertide. The connecting nerve fibers are also connected with a single lower ganglion; the lower halves accordingly coalesce, and as the result we have a double nervous cord traversing the entire ventral side of the body. In this worm there are no ocelli; the upper lip has tactile powers and is connected with the upper esophageal ganglia; its sense of taste is questionable.

Along the course of the double ventral cord, we have a more abundant collection of cells at each segment of the worm. This forms a ganglionic swelling from which is given off two nerves on each side. The anterior part of the segment is supplied by a few nerve fibers given off from the cord itself just anterior to the ganglion, thus securing concerted movements of the segments. The visceral system is supplied by a complicated ganglionic network on each side of the esophagus, starting from the commissures which unite the two upper ganglia, thus securing a concerted movement in the intestinal system. Here again is the shadowing forth of a nervous mechanism which is perfected in higher animal life. Can it all have been "by the gradual fortuitous and unguided operation of infinitely slow moving causes" that the progress toward perfection has been so infallibly maintained?

In the leech a still greater concentration of the nervous system obtains, a spinal ganglion doing duty for three or four segments, and the double ventral cord becoming almost fused into one, a hilobed ganglion receives the nerves from the tactile lips, and also the nerve fibers from ten ocelli which are situated around their margin. This hilobed ganglion is situated above the mouth, and corresponds with the brain of higher animals. It sends a nervous cord down each side of the esophagus which unites with its fellow, forming a supra-esophageal ganglion. From this ganglion, in form heart-shaped, are given off the nerves which supply the cutting jaws and the sucking muscles of the mouth. A correspondence with the "medulla oblongata" of vertebrate animals is here noticeable. It is continuous with the double ventral cord on which are developed 20 equidistant ganglia, which give off two nerves on either side, for the supply of adjacent segments.

The dorsal surface of the alimentary canal is supplied with a filament of nervous substance, by the supra-esophageal ganglion. Here is a foreshadowing of an important system of nerves. The sympathetic and the pneumogastric (lung and stomach) nerves in higher animals. Among invertebrates this is known as the "stomatogastric system." The commissures in many other of the invertebrate series connecting the upper and lower ganglia, rather than the ganglion itself, give rise to this system of nerves.



## USEFUL INFORMATION.

**EFFECT OF FROST UPON HYDRAULIC CEMENT.**—The following German experiments designed to ascertain the effect of frost upon hydraulic mortars and cements gauged with and without the addition of salt to the water have been quoted in the *Revue Industrielle*. Cubes of stone 6 c. m. area were used in these experiments, and were joined together with cement mixed with water ranging from pure rain-water to water containing from 2 to 8 per cent of salt. While the cement was yet fresh, the blocks were exposed in air at a temperature of 20° to 32° F., after which they were kept for seven days in a warm room. At the end of this time the specimens were examined. The cement made with pure water was quite crumbled, and had lost all its tenacity. The cement mixed with water containing two per cent of salt was in better condition, but could not be described as good; while that containing eight per cent of salt had not suffered from its exposure to the lowest temperature available for the purposes of experiment. It is possible that the salt merely had the effect of preventing the water in which it was dissolved from freezing at the temperature named, and so permitted the cement to set in the ordinary way. These results may, however, be usefully cited at this particular season, when outdoor building operations are liable to be suspended on account of frost, and the stability of green work is threatened by the same influence.

**ATMOSPHERIC RESISTANCE OF PAINT.**—Experiments made under the direction of the Dutch State railroads with various plates are reported to have proved that the red lead paints resist atmospheric influence much better than those of brown-red and iron oxides. The red lead paints adhered closer to the metal and possessed greater elasticity than the others. It was also found that better results were obtained if, before the paints were applied, the plates were pickled instead of being merely scraped and brushed. The test plates were pickled in muriatic acid, washed with water, thoroughly dried, and, while warm, carefully oiled. As iron and steel are peculiarly liable to corrosion when in salt water, vessels made of them require special protection. This can be given by covering the metal with some alkaline or basic substance, or the oxide of some metal electro-positive to it. Caustic lime and soda are very efficient for this purpose, and act equally well when made into a paint with oil, but their efficiency is destroyed when they cease to be caustic or when they are saturated with carbonic acid, which they absorb freely from the air. Magnesia is equally efficient, and does not absorb carbonic acid. It therefore makes as good material for a paint as could be desired; and, moreover, forms an excellent basis on which to lay an anti-fouling paint, which it protects from the galvanic action of the iron by insulating it, while it does not affect the anti-fouling qualities.—*Manufacturer's Gazette*.

**OIL ON THE WATERS.**—A German has taken out a patent for a device to be used on ship-board for distributing the oil upon the sea about the ship so as to reduce the destructive effect of the waves, and it is said that the right of the invention has been purchased by an officer of the North German Lloyd line. This consists of a rocket, to which is attached a cylinder filled with oil. The rocket can be fired with accuracy, and when it explodes the oil is scattered just where it is wanted. Several interesting experiments were made between Bremen and New York. In one the rocket was fired to a distance of 1500 feet and less distances. By the explosion of five rockets at a distance of from 1200 to 1500 feet from the ship, a space of 1500 to 2000 square feet of water was covered with oil and the waves were at once smoothed. The rocket was fired 900 feet against a gale. The importance of the invention to deep-water sailors consists in the certainty of explosion of the rocket at a sufficient distance to leave the vessel in calm water during a gale.

**COTTONSEED FOR ADULTERATION.**—It is estimated that about 50,000,000 pounds of cottonseed oil were used in the United States last year in the adulteration of lard mixed with about twice as much of other material, most of which was pure lard with the leaf left out. This total of 150,000,000 pounds is a little less than one-half of the exports, or about 30 per cent of the whole production. From this it may be inferred that cottonseed oil forms about one-tenth of all the material which is sold as "lard" in the United States, and nearly all of it is used in a few well-known establishments in New York, Philadelphia, Chicago, St. Louis and Kansas City.

**ASBESTOS CLOTH** is being used for wearing apparel by the firemen in Paris. The firemen, according to a newspaper report, arrived at the scene of a recent fire—the basement of a house—clad in asbestos cloth suits, and were enabled to descend into the basement and master the flames in a short time. The firemen of Japan have long worn asbestos armor.

**INCOMBUSTIBLE PAPER.**—A paper that resists the action of both fire and water has, it is said, been recently invented in Germany. The manufacture is accomplished by mixing 25 parts of asbestos fiber with from 2 to 30 parts of alumi-

num sulphate. The mixture is moistened with chloride of zinc and thoroughly washed with water. It is then treated with a solution of one part of resin soap in 8 or 10 parts of a solution of pure aluminum sulphate, after which it is manufactured into paper, as is done from ordinary pulp.

**"PETROGEN."**—It is now proposed to give natural gas a new cognomen. The Oil City Derrick has found what it considers fills the want. It says: "Now, that which is commonly called natural gas is as truly a rock gas as petroleum is a rock oil. Neither may be the natural product of the rocks, but they are obtained from or by drilling into the rock. As gas is an appropriate root or term for gas, we would suggest the name of petrogen for what is now called natural gas. The use of words of similar derivation in this way would carry the impression immediately to the mind of the close affinity between oil and gas from the rocks, between petroleum and petrogen."

**AN EMERY-WHEEL** may be very readily turned up by using a bar of wrought iron, or, better yet, a bar of copper, instead of a diamond. The reason for this is that the wrought iron or copper being soft, whether the grains of emery are removed from the wheel or not depends upon which is tougher, the metal or the cement.

**RAINFALL OF THE GLOBE.**—It is estimated that from 34,000 to 35,000 cubic miles of rain falls every year upon the surface of the globe. The rivers carry off barely one-half; the rest disappears by evaporation, by the absorption of the earth and by being taken up by plants, animals and mineral oxidation.

**ABOUT 2500 words** are all that are used in ordinary talking and conversation, although there are some 20,000 words in the English language. Different authors vary in the number of the words they use, but the difference is but slight. Shakespeare found 4000 words sufficient for all his works.

**TO PREVENT MILDEW.**—A solution composed of alum, 2 pounds; water, 60 pounds; blue vitriol, 2 pounds; gelatine, 1 pound; acetate of lead, ½ pound—all thoroughly mixed, will prevent mildew from affecting wood, clothing, fabrics, etc.

**ALUMINUM FOR DENTAL PURPOSES** is said to be coming into favor. It is pronounced better than rubber and less in cost than gold. It is bright, strong, odorless, and as healthy to the gums as gold or platinum.

## GOOD HEALTH.

## The Cancer Discussion.

Much attention has been given by European medical societies to the occurrence of cancer in certain localities which seem to favor the multiplication of cases. The following are given as a specimen of its prevalence within a circle of some few miles of this city:

Mrs. J. M. Dougherty had surgical operation Aug. 6, 1887; died Dec. 22, 1887, aged about 70. Mrs. McFadden near San Leandro was affected much the same as Mrs. Dougherty and had two operations. Died during the present year, aged about 50.

Mr. Wm. Tehan near Dougherty's Station died from cancer of throat, no operation, aged 45.

Mrs. Peterson, Contra Costa Co., at Danville, operated on by Dr. Lane, pronounced cured, aged about 43.

Mrs. Armstrong of Hayward had two operations; her physicians now propose to remove both breasts.

"These four ladies all had cancers upon the breast, and, living near here, have come under my observation." So writes our informant.

"These are all late cases. It is very strange there should be so many; I cannot understand why."

Mrs. Mendenhall (an old patient of Mrs. Dr. Cook's) is said to be quite well, only a bare trace of the swelling left; treated May, 1885.

In a paper given in this month's *Scientific Monthly*, Robert Morris writes: "Treatment by medicines is of no avail in curing malignant growths. The reason why medicines are useless in such cases is evident (sic) if we look at the subject through the germ theory." Now, there has been no cancer microbe discovered as yet, and we must reckon it a pure assumption on Dr. Morris' part, who unscientifically says: "It is safe to say that we will never have a drug which will cure cancer." He goes on to propose that legislation should be called to the surgeon's aid to suppress all attempts at curing cancer except by the "operator's fingers aided by sharp eyes."

Summing up the points of an address on "What constitutes the malignancy of cancer?" on the other hand Dr. Herbert Snow of the Cancer hospital, London, expresses the opinion, which is gaining ground among many close clinical observers of this more and more widely extending disease, that the phenomena designated by the term cancer "result from conditions which irritate normal protoplasm, cause it to proliferate abnormally, and to assume a quasi parasitic vitality. These conditions may be mechanical; in a much larger proportion they are neurotic. That is the farthest point we have yet reached;

nor do I yet see how our knowledge of causes can make much advance until we know far more than at present about the ultimate properties of protoplasm, and the manner in which this is influenced by certain states of the nervous system."

Intelligent local medication, combined with such drugs given internally as will build up the nervous system, and cause a diminution of the parasitic growth, is the rationale of the treatment which has had such success in this city; the long-continued immunity from any recurrence of the disease in those who have been cured bears out the views of Dr. Herbert Snow. An early application of whatsoever treatment he adopted is absolutely essential. Waiting for the appearance of invisible microbes and doubtful cells is only hastening the evil day.

## To Save Doctors' Bills.

Never go to bed with cold or damp feet. Never lean with the back upon anything that is cold.

Never begin a journey until the breakfast has been eaten.

Never take warm drinks and then immediately go out into the cold.

After exercise of any kind, never ride in an open carriage, or near the window of a car for a moment; it is dangerous to health or even life.

Never omit regular bathing, for, unless the skin is in regular condition, the cold will close the pores and favor congestion or other diseases.

When hoarse, speak as little as possible until the hoarseness is recovered from, else the voice may be permanently lost, or difficulties of the throat be produced.

Merely warm the back by the fire, and never continue keeping the back exposed to the heat after it has become comfortably warm. To do otherwise is debilitating.

Never stand still in cold weather, especially after having taken a slight degree of exercise, and always avoid standing on the ice or snow where the person is exposed to the cold wind.

When going from a warm atmosphere into a colder one, keep the mouth almost closed so that the air may be warmed by its passage through the nose ere it reaches the lungs.

Keep the back, especially between the shoulder blades, well covered, also the chest well protected. In sleeping in a cold room establish the habit of breathing through the nose, and never with the open mouth.—*New York Mail and Express*.

**CONDIMENTS AND INDIGESTION.**—Cayenne pepper may be selected as a typical example of a condiment properly called. Mustard is a food and condiment combined; this is the case with some others. Curry powders are mixtures of very potent condiments with more or less farinaceous materials and sulphur compounds, which, like the oil of mustard, onions, garlic, etc., may have a certain amount of nutritive value. The mere condiment is a stimulating drug that does its work directly upon the inner lining of the stomach, by exciting it to increased and abnormal activity. A dyspeptic may obtain immediate relief by using cayenne pepper. Among the advertised patent medicines is a pill the active constituent of which is cayenne. Great relief and temporary comfort are commonly obtained by using it as a "dinner pill." If thus used only as a temporary remedy for an acute, and temporary, or exceptional attack of indigestion, all is well; but the cayenne whether taken in pills or dusted over the food, or stewed with it in curries or otherwise, is one of the most cruel of slow poisons when taken habitually. Thousands of poor wretches are crawling miserably toward their graves, the victims of the multitude of maladies of both mind and body that are connected with chronic incurable dyspepsia, all brought about by the habitual use of cayenne and condimental cousins. The usual history of these victims is that they began by overfeeding, took the condiment to force the stomach to do more than its healthful amount of work, using but a little at first. The stomach became tolerant of this little and demanded more; then more, and more, and more, until at last the inflammation, ulceration, and torpidity, and finally the death of the digestive powers, accompanied with all the long train of miseries to which I have referred.—*Knowledge*.

**DYING.**—A leading physician says that a patient who is lying dying of exhaustion is generally dying of starvation. We give him beef tea, calf's-foot jelly, seltzer and milk—that is, a small quantity of the sugar of milk and some fat; but the jelly is the poorest sort of food and the beef tea is a mere stimulant. The popular belief that beef tea contains "the very strength of the meat" is a terrible error—it has no food value.

**TREATMENT OF POLYPUS.**—It is recommended by Dr. Bell of Canada to treat nasal polypi by daily injection of tannin, from five to ten drops of a concentrated solution being injected by means of a hypodermic syringe. After a few days of this treatment, the polypus sloughs and comes away without bleeding.

**TOBACCO AT YALE COLLEGE.**—About 20 per cent of the Freshman class at Yale University use tobacco. The average heretofore has been only 16 per cent. Dr. Seaver finds, however, that the class is unusually healthy, though not provided with a large number of large men.

## Spring Valley's Lengthy Aqueduct.

The new pipe of the Spring Valley Water Company has been laid under the bay. The length of the pipe under water is 14,000 feet, and the entire length of pipe from the new catchment reservoir in Alameda county to Crystal Springs, San Mateo county, is 27 miles. Starting from the reservoir on Alameda creek, the tube conduit generally follows the line of the old Valljo mill flume; passing Vallejo's mill, it crosses the Alameda creek on a bridge, thence going in a southeasterly direction along the public road through the towns of Centerville and Newark. Thence it follows along the railroad right of way, through the salt marsh, on a pile trestle to Dumbarton Point, crossing a navigable slough 300 feet wide, with submarine pipe, on the way. It then crosses San Francisco bay in a southwesterly direction, there being a double line of 6300 feet of submarine pipe, to the westerly shore of the bay. From this point it runs first along a pile trestle about 2000 feet long through the marsh, and in a southwesterly direction, to the public road. Thence it follows the public and county roads through Menlo Park, Redwood City, Belmont and San Mateo to the junction with the 44-inch Crystal Springs pipe.

The piping, which was made by the Mason Iron Works of this city, is of wrought iron, and except where it crosses the bay is 36 inches in diameter. That which crosses the bay is 16-inch tubing, five-sixteenths of an inch thick. Previous to its being laid it was galvanized inside and outside, and then dipped in a preparation of asphaltum. The bay where the piping crosses it is about 7000 feet wide. From the Alameda shore the bed of the bay slopes to a depth of 60 feet and then gradually rises again, leaving a navigable passage about 2000 feet wide. From this point to the western shore the bed is from 15 to 10 feet below the water, except in one place, where it appears above the water at low tide. For the supply of water which will be conducted through this pipe line it will be necessary to erect new pumping works, as the water has not sufficient pressure of itself to carry it as required. There are 15 miles of pipe yet to be laid on land.

## Amalgamating Gold.

## Use of Silver-Plated Plates.

The saving of the gold after it is separated from the ore is one of the principal troubles of the millman and metallurgist. Formerly blankets, gunny sacks and other fibrous materials were mainly employed for this purpose. Then came copper plates, but finally these have been superseded by the use of copper sheets plated with silver by voltaic electricity or galvanism. These silvered plates possess great advantages not only over the fabrics mentioned, but also over the unprepared or ordinary sheets of copper, the large amount of quicksilver they are capable of holding enabling them to catch and retain the fine and float gold which escapes these other appliances, the extra quantity of gold so saved paying the entire cost of these articles in a very short time. They are of simple construction, easily attended and kept in order, and capable of being replated when the silver wears off.

The most extensive and the earliest established Silver-Plating Works on the Pacific Coast are at 653 and 655 Mission street, San Francisco, E. G. Denniston, proprietor.

By reason of the superior work here turned out, this establishment does a large business, the Denniston plates being in very general use throughout the entire mining regions west of the Rocky mountains; also in Mexico and Central America.

As it is important not only that the work be well done, but that the silver applied to the plates be of full weight, they should be ordered of reliable and responsible parties, such as Mr. Denniston is known to be. It is said that this manufacturer has in his possession more than a thousand letters from millmen and metallurgists on the Pacific Coast, testifying to the superiority of his silverized copper plates. He has also been awarded the first premium at all the fairs of the Mechanics' Institute for the last 12 years.

These plates are made to order—plain, corrugated or filled, and of any size, shape, or thickness of copper desired. The silver is put on by weight, the amount being determined by the prices. His circular, which will be furnished on application, gives full particulars.

**NATHANIEL S. KEITH** has filed a bill of complaint in the United States Circuit Court against the Pacific Coast Electrical Construction Co. and the Oakland Electric Light and Motor Company to restrain the defendants from manufacturing and using certain dynamo electrical machines, of which he claims to be the inventor. He claims that the defendants have infringed on his patents and sues for damages, to be determined by the court.

**A NOVEL ARMAMENT.**—The Cramps of Philadelphia have a contract to furnish a large gunboat to be fitted with a Zuluski cannon. The cannon proper will be 60 feet long, and is fired by compressed air forced through a number of tubes—35 in number. The cannon will throw a dynamite cartridge accurately seven miles.

**SPEED FOR A GRINDSTONE.**—A grindstone with 4-inch face, 40 inches in diameter, with 24-inch shaft and 10-inch collar on each side may be safely run at 75 revolutions a minute.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**SUTTER CREEK.**—Cor. Amador Ledger, Feb. 9: The first cleanup has been made at the Wildman mine. There is always much interest attached to the first cleanup of a new mill, as it affords a fair basis of calculation whether the ore crushed is of a grade to warrant expectations of a long and prosperous career of mining activity. The result in this case, notwithstanding that a considerable portion of the rock was taken from the dump, was satisfactory beyond all expectations. The amalgam was retorted last week and sent to the mint at San Francisco; Mr. Tregloan, the superintendent, has also gone down in the interest of the company. The other mines around here are running all right, and are expected to clean up in a few days.

**DRYTOWN.**—A fine-looking ledge, about two feet wide, was struck in the Cosmopolitan last Thursday. A number of pieces showing free gold and good-looking sulphurets were taken from the ledge. Stringers varying from two to six inches seem to be coming from every direction. Indications are good for striking the main ledge before many days. Carrara & Mayden have just finished crushing about 200 tons of rock taken from the North California. The Potosi Co. have about 200 tons of ore on the dump. The mill commenced crushing this morning.

**AMADOR GOLD MINE.**—Amador Ledger, Feb. 11: Work is being pushed ahead again at this mine on two shafts. Between 15 and 20 men are employed. The idea of sinking the large three-compartment shaft to strike the east ledge has been abandoned for the present. It is understood that Rankin, Brayton & Co. of the Pacific Iron Works, who have taken the contract to build a 60-stamp mill for the Co., will immediately proceed with the work. Of course, it will all be made and fitted in San Francisco, so that the work on the ground will occupy but a few weeks. The company will make the foundation for the mill. Every safeguard, we are informed, has been provided for so as to secure a good, substantial working mill. It will be erected at a point in Hunt's gulch, where a pressure of over 200 feet can be had.

**KENNEDY.**—The condition of affairs at this mine is not as bright as could be wished. Over 20 men have been discharged lately, on account of the exhaustion of ore in the levels from which the mill has been chiefly supplied. The lower level, 900 feet deep, has not been operated for several months, as the water has risen above it, and with the present appliance for taking out the water, it is difficult, if not impossible, to keep it free and keep the mill going at the same time. It is now intended to sink 100 feet and perhaps 200 feet deeper, which will take from three to four months to complete. The mill will be idle most if not all of this time, and the force of employees will be correspondingly reduced. The repairing of the north shaft is progressing, but will take another month to complete.

**PLYMOUTH CON.**—The Pacific shaft was again opened last Saturday, when it was found that the fire was still burning, and the air so bad that it could not be approached. Everything was again closed, and it is reported that no effort will be made to reopen again for several weeks. All the men at the Empire were discharged early last week, which in itself is a serious blow to Plymouth, as this mine gave employment to more hands than its richer neighbor, the Pacific. It is said that henceforth the Empire will not be operated except through the Pacific. If this be so, it means the shutting down of one of the 80-stamp mills, as both cannot be kept running through one shaft. Many miners have already left Plymouth, and more are leaving daily. The impression is strong that things will be moving along as briskly as ever in the course of a month or two.

**MISCELLANEOUS.**—The roller quartz-mill of the McKenzie Bros. near Irishtown is being moved to another location a short distance above its old site. The five-stamp mill on the Spagnoli Bros.' mine near Clinton has been running steadily for two weeks, with good indications. There are only two or three men working at the big tunnel at Middle Bar. R. Ruyné has quit the boarding-house and moved his family to Jackson.

#### Butte.

**COAL MINE DISCOVERED.**—Grideley Herald, Feb. 8: Last week two gentlemen prospecting in the Ruttes near Sutter City opened up a vein of coal. Specimens of the article were brought to this city Saturday. Assisted by several others, we have tested the fuel this week and pronounce it a good specimen of what is known in the East as "cannel coal." It is a good coal for heating purposes, but not very valuable for steam-making, lacking the combustible gases peculiar to the anthracite species. It burns slowly, making a good flame, and does not slack or break up as quickly as the varieties used for manufacturing purposes. If the vein is, as reported, two to four feet in width, and has any depth, the finders have got a better thing than the best ranch in Butte. We apprehend the deposit to be an extensive one.

#### Calaveras.

**RESUMED.**—Mountain Echo, Feb. 8: Work was resumed in the Star of India mine, situated near Smith's flat, one day last week. This mine is owned by Curtis & Co., and we are informed is looking exceedingly favorable. The ledge is said to be about 20 feet in width, and the rock is estimated to yield not less than \$3 per ton. The owners feel quite jubilant over the present outlook.

**COPPEROPOLIS.**—Cor. Angels Record, Feb. 10: Several times a day we hear the whistle of the Union copper mine, giving notice to the people that the revived enterprise is still being pushed ahead. The 20 years vacation in the working of this rich mine has been a tedious and even dreary postponement of the hopes and expectations of people hereabouts, but finally the revival has set in. The Union was visited by its agent, Mr. Ranlett, about eight months ago, and now the buildings look very much renewed and brightened up. Since the water is out and the ore stopes open, the noise and activity about the place are of great interest to our residents. A son of the agent, Ranlett, and J. A. Fersen, the boss, appear to be the resident managers. The output of

actual copper ore, put up in strong sacks of some 150 to 175 pounds, already shipped to Milton, or now on hand, aggregates about 300 tons. This presents an idea of business the significance of which is not to be mistaken—and an improvised assay office is inclosed under the big shed close by, and every day the quality of the ore is tested, which we are informed will reach about 16 per cent. Where this ore is sent to we have not yet made inquiry, well satisfied with the constant but moderate increase of men which now numbers around 40.

#### El Dorado.

**STRUCK A LEDGE.**—Placerville Observer, Feb. 11: The El Dorado big tunnel, toward which all eyes have been turned and which has been the center of attraction among mining men ever since the work was started of driving the tunnel, has at a distance of 250 feet struck a three-foot ledge, in which the quartz prospects free gold. This will be good news to the stockholders. The work of driving the tunnel is being pushed rapidly ahead under the efficient management of Superintendent McNeil, and he expects to strike the next ledge within 62 feet. Beyond this and the goal to which the company is striving, lies the mother lode. This is supposed to be a veritable bonanza.

**ZENTGRAFF.**—The Zentgraff mine, at Wild Goose, is now running day and night. This mine employs about 40 men, and is one of the few mines that have been working profitably from the start. They are now engaged in running a lower tunnel, and as soon as the lead is struck another mill will be erected. Both mills can be kept busy pounding out the precious metal, as the ore is easily extracted.

#### Inyo.

**THE SODA WORKS.**—Inyo Register, Feb. 11: The Soda Co. is cutting out two acres more of vats near old Swansea, and it is stated will shortly begin a lot of new work at the south end of the lake. They are shaping a huge monopoly of the only soda lake in America, and for the sake of the enormous business to be evolved out of it in case a process can be found enabling them to compete with the German product, the enterprise is grand and decidedly commendable. Engineer Wrinkle is still operating on his experiments at Dayton, and a new experienced chemist from Europe is soon to be in active charge.

**MINING NOTES.**—The Union mine (Cerro Gordo) lessees are shipping about two carloads per week of ore and concentrates from the new depot at Boland, south of Keeler. The new works at that point are now in good shape for steady work all summer.

**MINING SALE.**—Independent, Feb. 11: The Dark Horse mine, near Bishop creek, has been sold. The buyer is Mr. W. Charles, as agent for other parties. The mine was owned by four parties, two of whom are J. G. Bircham and F. P. Blaisdell, both of Round Valley. A good deal of prospecting has been done on the Dark Horse, and a very large ledge has been developed, said to be about 60 feet wide. The ore is low grade, but there is an immense amount of it, it is easily mined, and there is an excellent site for a mill and an abundance of water. A very large mill will likely be built soon and the mine worked on an extensive scale.

#### Nevada.

**ENCOURAGING PROSPECTS.**—Foothill Tidings, Feb. 9: The shaft at the Brunswick mine is now at a deeper point than has ever been attained heretofore. A solid ledge varying from 2½ to 3 feet in thickness and between two as pretty walls as man would want to look at, according to Supt. Tilley, justifies the opinion that the prospects are better than any previous developments have shown. The rock shows sulphurets in quantity and of good quality, and improves with depth. A level known as the 300 and which was the deepest workings of the old companies has been passed through by the shaft. In this level drifting will be done. There are 14 men employed at the Brunswick, and this number will be augmented next week, when stoping will be in order. The mill will start up at about the same time.

**A RICH STRIKE.**—Foothill Tidings, Feb. 10: Recent developments at the Pennsylvania have been the cause of much talk among mining men, and it is confidently believed the pay lead has at last been struck. Two weeks ago Capt. James Hamill & Co., lessees of the mine, uncovered a two-foot ledge of very rich ore in the bottom, or 300, level north. Pieces of the rock on exhibition at Byrne's drug store are more of a "specimen" nature than milling. The gold is very heavy and permeates the rock, which is of a lively character. Since that discovery work has been prosecuted steadily, and the ore extracted is of high grade. The Pennsylvania adjoins the Empire on the west and is therefore in a good locality. It is owned by the estate of M. Byrne, deceased, and others. A new shaft will be put down directly on the ledge by the lessees. This work will be commenced very shortly. Capt. Hamill is well known as an experienced practical miner, and he is quoted as saying "the mine is worth \$100,000 if it is worth a cent."

**PET GRAVEL MINE.**—At this claim the pumping and hoisting plant will be in readiness by Monday or Tuesday, and in a week hence the shaft will be clear of water and drifting under way. A water-wheel with "Pelton" buckets is in place and will supply motive-power. A reservoir has been constructed on the hill above the shaft and 500 feet of pipe put in place, affording a pressure of 125 feet.

**WILL GET THERE JUST THE SAME.**—Superintendent Mainhart informs us that the water in the Omaha & Lone Jack Consolidated has been lowered to between Stations No. 4 and No. 5—a depth of about 350 feet. The mine is 700 feet deep, and as two heavy 12-inch pumps are to be put in, the "bal" will not be "forked" for about two months. Pelton water wheels run the machinery. A disinterested party who was called to the North Banner mine today, on business, tells us that a cleanup is being made at the mill and that the plates and battery indicate returns equal to if not surpassing expectations. Because of water in the shaft, operations at the Cedar mine have been suspended until April 1st. This mine is at Nickerson's ranch, on Wolf creek below this city, and is being opened up by the Grass Valley Mining and Development Company. We are informed that rock of exceeding richness is being and has been taken out of the breast of the North Star shaft for the past week.

**THE DELHI MINE.**—North San Juan Times, Feb. 11: The Delhi Mining Company are adding to their possessions. They are so well convinced that

they have a meritorious mine that they are purchasing the extensions on the same vein or lode and are procuring patents from the United States Government for such extensions. The Delhi mine is no longer an experiment. Less than two years ago it fell into the hands of Robert McMurray and others and it has now declared its tenth dividend of \$10,000, paid for the construction of a mill of 18 stamps and other machinery, built sulphuret works, paid for the erection of extensive boarding and other houses and has left in the treasury many thousands of dollars. If there is a mine within this State that can make a better showing than this we don't know it.

**ELEVATOR PROCESS.**—We learn that the Milton Mining Company are making arrangements to work their mines at and in the neighborhood of French Corral by the elevator process. They will utilize their long tunnel for the storage of their debris, emptying the debris into the tunnel through the shafts here and there along the line of bedrock.

#### Plumas.

**CRESCENT.**—Greenville Bulletin, Feb. 9: The usual force of men is employed at the Crescent mine. Progress, owing to the hard rock and some trouble in banding the water, is rather slow. There is some talk of the Green Mountain mine resuming operations, but nothing definite seems to be known.

#### San Diego.

**A RICH STRIKE IN BANNER.**—Julian Sentinel, Feb. 10: Joseph Marks showed us a piece of quartz from the Cincinnati Bell, owned by W. L. Frederick of Banner. It came from a vein ranging from three inches to three feet in width, and is the richest average rock we ever saw. The rock is said to discount the Chariot quartz in its palmy days. This is causing considerable excitement among our mining men.

#### Shasta.

**WHISKYTOWN.**—Cor. Shasta Courier, Feb. 11: Whiskytown, which is situated near the confluence of Whisky creek and Clear creek, remains much the same as in days of yore. The Woodwards are there, Kesler is there, John Harrison is there, and many of the old miners still linger near, and among them we should not forget to mention I. W. Zent, a prospector and miner, and who is operating in Eastman gulch. The latter is still at his post of duty, and showed us a piece of gold quartz weighing 7½ ounces, valued at about \$125. It was found in Eastman gulch a few days since. Four years ago a piece of gold quartz was found by the same party in the same place that weighed seven pounds, valued at about \$300. About three years ago the same party found a piece of gold quartz in the same place that weighed 11 ounces, valued at \$130. These several finds have been in a gulch leading square up against a mountain range running toward Know Nothing Gulch, Mad Mule, Banghart and Mad Ox mine. Closing, we would add that the source of Whisky creek, the north of Old Bally, French Gulch and Deadwood are the greatest mining-fields now open to exploration and development in Northern California.

#### Sierra.

**HOWLAND FLAT.**—Mountain Messenger, Feb. 11: Thos. Fant of Howland Flat, where he is interested in drift mines, working at Bunker Hill, came to town Saturday. He reported an average of four feet of snow at that mining camp, frozen to ice. The prospect is good for a fine water season. Bunker Hill Co., 1½ miles this side of Poker Flat, recently put on four extra hands, making, in all, seven men drifting for gravel.

**WIDE AWAKE.**—The Wide Awake drift mine, Alabama Hill, will soon be heard from; the main tunnel is in 700 feet, face now soft bedrock. The channel overhead has dropped 18 inches below the timber caps, showing splendid blue quartz gravel (that prospects well) and large and small quartz boulders.

**BALD MOUNTAIN EXTENSION.**—Supt. Meikle of the Bald Mountain Exchange Co., Forest City, was over on Tuesday, and reported everything in good order and indicative of a prosperous future for this valuable mining property. Sixty men are working and the force will be increased as soon as water is more plentiful. Gold yield for the past week 165 ounces—over \$3000.

#### Placer.

**NEW CHANNEL.**—Placer Republican, Feb. 8: F. Chappellet found a new channel at the Live Oak mine near Forest Hill, about a week ago. It is from 40 to 50 feet higher than the old works, and the gravel contains the same character of coarse gold which was lost in the old channel a few months ago, and it is also full of large quartz boulders. Mr. Chappellet has as yet found only one rim, but the channel is at least from 175 to 200 feet wide, and it has already proved to be at least 7 feet thick with indications that it may be 15 or 20. That it contains considerable gold may be seen with the naked eye, but as it has not yet been prospected, its richness is a matter of conjecture. The miners think this discovery is the making of the Live Oak claim.

#### Trinity.

**A BIG SLIDE.**—Trinity Journal, Feb. 11: During the late storms, Mr. A. Rumlft, who owned a placer mine on Morrison Gulch, about ½ mile from Coffee creek, was spending a few days at Trinity center. On Monday, Jan. 30th, he went to the mine and gathered up all his tools, etc., and 5 o'clock P. M. went into his cabin. While sitting by the fire he heard a rumbling, roaring sound, and everything shook and rattled about the cabin. Just then he glanced out of the window which views the upper portion of the gulch and the whole mountain-side appeared on the move. Frightened and excited, he ran out of the cabin and up on the high ground back of the cabin, when a big palm tree not far from him popped like a pipe-stem, the slide taking the roots downward so quickly that the top fell back. This added to his fright and he lost no time in getting down to Coffee creek. He went to what is known as the Blythe Cabin and spent the night as best he could. Wednesday morning Mr. R., accompanied by three other parties, went to the scene of his recent thrilling experience, where the change in the country made it almost unrecognizable. The slide had started from the Blythe ditch, where it crosses Morrison gulch, and breaking with the ditch for about 200 feet started down the gulch, taking everything before it, cleaning the gulch out completely from the starting-point to Coffee creek, a distance of 1½ miles; not a tree was left standing, for nothing had any

power of resistance before the immense body of earth and snow rushing down like a hurricane. Mr. Rumlft's reservoir, pipe, derrick, water-wheel and a good portion of his claim was taken completely away and buried in the creek ½ mile below. The slide missed the cabin about 20 feet, which is the only thing it did miss. The large trees were broken up into sawlogs as they rode down the gulch, and such a mass of debris as lies in Coffee creek can scarcely be imagined. The creek is entirely turned from its natural course and has formed a new channel. The friction of this terrible mass tore up cement in the bottom of the gulch that would not yield to the pick of the miner. There was about 4 feet of snow at that place and it is supposed that the ditch became blocked and the water ran over or through its banks till the ground became thoroughly saturated, hence the slide. Mr. Rumlft's loss will reach about \$10,000.

#### Tuolumne.

**GOLDEN GATE MINE.**—Sonora Democrat, Feb. 11: We were shown some very rich rock Monday, from the 180-foot level of the above mine. The ore had been roasted and wherever the sulphur, presumably arsenical pyrites, had been, there was a fine showing of gold. In view of the fact that this discovery was made at the greatest depth yet attained, and is an entirely new chute, a new and important future has come to this valuable property.

#### NEVADA.

##### Washoe District.

**SIERRA NEVADA.**—Virginia Enterprise, Feb. 11: The southwest drift from the main north drift on the 520 level, which is now running in a southerly direction, has been extended 40 feet; total length, 1293 feet. It continues in a vein material composed of quartz, clay and porphyry.

**SAVAGE.**—On the 400 level the north drift has been advanced 40 feet, and the south drift 30 feet. Both are in fair grade ore. On the 600 level the south drift has been extended 25 feet, and continues in ore of excellent quality. Are extracting and shipping to the Mexican mill about 140 tons of ore per day from the several levels between the 400 and 600 stations. The improvement mentioned in last week's report on the 900 level continues both in quality and quantity. The bullion shipment for the month of January amounted to \$40,000.

**HALE & NORCROSS.**—On the 400 level the south drift has been advanced 20 feet, and the north drift 18 feet. Have started crosscuts east and west from the face of the south drift. The west crosscut is advanced 12 feet in ore of good quality. The north drift continues in stringers of ore. From the top of the north upraise from the 700 level a drift has been started northwest to connect with the south drift from the Savage mine on the 600. This south drift from the Savage side is out about 50 feet, and the northwest drift from the north upraise is advanced 45 feet. The shipments of bullion for the month of January amounted to \$35,000.

**BEST AND BELCHER.**—On the 425 level west crosscut No. 3 opposite east crosscut No. 3 has been extended 25 feet; total length, 75 feet. This crosscut has passed through 50 feet of good-looking quartz, giving low assay values. The main north drift has been extended 25 feet; total length, 445 feet. The formation is quartz and porphyry. Upraise No. 1, started at a point 130 feet north from the south line, has been carried up 10 feet; total height, 35 feet. This upraise is passing through quartz showing value by assay.

**OCCIDENTAL.**—On the 200 level in the north incline winze, 35 feet above this level, have extended the south drift 10 feet; total length, 28 feet. The ore extracted on this level has been held in the mine. Sixty-five feet below the 200 level a north drift has been advanced 9 feet. In the lower tunnel, 150 feet south of the north incline winze, a south drift has been advanced 12 feet. Extracted 15 tons of ore.

**CROWN POINT.**—There is a fine circulation of air since the 400 and 500 levels were connected by the completion of the raise from the latter. Good headway is making in the crosscut started on the Belcher line, and also in that started last Tuesday opposite the west crosscut. Both these crosscuts are on the 400 level. Good headway is being made in the south drift on the 400 level. It is being advanced in a favorable formation.

**GOULD AND CURRY.**—On the 250 and 300 levels are still prospecting for ore. Have extracted about 250 tons in the past week of fair-grade milling ore, making a total of 300 tons now in the ore-house. On the 1300 level the south drift from the east drift has been extended 37 feet; total length, 270 feet. The formation is clay, porphyry and streaks of quartz.

**CON. CAL. & VIRGINIA.**—Ore of high grade is being stoped out at the bottom of the winze sunk below west crosscut No. 2 on the 1435 level. The usual prospecting work is being done on the 1300, 1600 and 1650 levels. The usual amount of ore has been sent to the mills on the Carson river, and the battery assays will average about the same as last week.

**BELCHER.**—On the 400 level the crosscut is in a distance of 47 feet, the face showing material of a favorable character. The south drift on the 500 level is out 151 feet. The material is principally quartz, clay and porphyry. There is some water coming in. Good headway is making in the drift to connect with the Suto tunnel.

**CHOLLAR AND POTOSI.**—Are prospecting promising ground at several points, and in places are obtaining some metal-bearing quartz. The ore-producing sections continue to look well, and are yielding as usual. The mill is kept running, and the ore worked is yielding well under the Logan process.

**MEXICAN.**—No. 2 crosscut west from the main north drift on the 1300 level, 100 feet south of the north line, is out a distance of 232 feet. The face continues in soft porphyry in which clay slips are frequently encountered.

**YELLOW JACKET.**—The daily shipments to river mills amount to 350 tons. The ore development near the Confidence line continues to show improvement. Since putting in a blower the air on the 1100 level has been good.

**JUSTICE.**—Good progress is being made in the raise which is to connect the 340 and 490 levels. Other prospecting operations are going ahead as



usual. There are on the dump over 1500 tons of good milling ore.

**UTAH.**—On the 472 level west crosscut No. 2, 400 feet north of the main west drift, have started an incline upraise. This upraise has been started in a favorable-looking quartz and porphyry formation.

**UNION CON.**—No. 1 west crosscut, 100 feet north of the south line on the 1200 level, has been advanced 20 feet; total length, 45 feet. It is in vein porphyry of a favorable appearance.

**ANDES.**—A good deal of prospecting is being done at points above the 400 level, and in one or two places promising streaks and bunches of ore have been encountered.

**ALPHA, IMPERIAL AND EXCHEQUER.**—The drifts on the 382 level continue in promising material, with streaks and bunches of good ore in places.

**ALTA.**—The usual work is being done on the ore-producing levels, but the mill has not yet been started up, owing to the bad condition of the roads.

**BENTON.**—The drifts on the 725 level are being pushed ahead as usual. The formation promises well, the ground showing indications of fertility.

**SEGREGATED BELCHER.**—On the 1300 level the drift south from the upraise is out 126 feet. The material is vein porphyry of a fertile appearance.

**OPHIR.**—The upraise from the 1465 level continues in the quartz formation encountered last week, and the assays obtained are promising.

**BULLION.**—A working station is being excavated at the 500 level, from which prospecting drifts will be sent out.

**ALPHA.**—Some streaks and bunches of ore are being found in the east drift on the 382 level.

**SCORPION.**—Are still drifting north and south along the vein on the 300 level.

#### Columbus District.

**MINES AND MILLS.**—Esmeralda *News*, Feb. 12: However dull it may be in other parts of the State, Candelaria can always be relied on as a bullion-producing town. The dawn of the discovery of the mines thereabouts was one of promise, and for years has the old camp held front rank among paying mines. The probabilities for an everlasting continuance of this record are brighter than ever. There have been better times there than at present, but the developments made during the last year have created a confidence in the merit of the mines encircling that most hospitable town. The Mount Diablo mine is an unlimited source of wealth to its owners; but from the grass-roots down to the lowest depth of its present works "it has paid big." There has been no end to the vein and its exact width is not now definitely ascertained. With its present facilities for handling and reducing the ore produced, it is certain that the day of its shut-down will never come. It would have been better for the people and for the company to have erected its reduction works at the lower end of the town instead of at Sodaville, and no doubt the company will at some future day conclude to establish works in closer proximity to its mine. It has over 100 men on its pay-roll and they are promptly paid. There is the Holmes lying idle and without excuse, except that silver is at such discount that its already wealthy owners would rather the ore containing the precious metal should remain in the ground—nature's vault—than be compelled to dispose of it at such an outrageous discount. The Holmes is not one mine, but is the name of a series of at least a dozen mines each of which was a dividend-producer. The Georgene series, whose ore dumps and hoisting works are the first to attract the notice of those visiting the town, is owned by an English syndicate. The efficient management of those mines has helped to build up the confidence that mining men have in the mines of that district. The Victor and Georgene with parallels and extensions form the Georgene group and is owned by the Candelaria Water Works and Milling Co. In addition to its mines, the company has one of the finest and best equipped 30-stamp mills on the coast, and though temporarily closed for needed repair it will be started within a few days, when the steam whistles of mines and mill will be sounded in chorus. There is a large quantity of ore at the mill waiting to be pulverized, and there is an abundance in sight to keep the mill at work to its utmost capacity. The Georgene company has done a great deal for Candelaria, and it is extending its reputation for good throughout the county by its liberal terms to small mine-owners for reducing ore. There are many other mines—the Lucky Hill, Chief of the Hill, Potosi and others equally as valuable as the Diablo, Holmes or Georgene, and they will command attention and be worked as they should. There will be a revival in mining throughout this State this summer, and with such showing as the mines in Candelaria have and can make, there is every reason for increased activity in and about the camp.

#### Eureka District.

**ORE SHIPMENTS.**—*Sentinel*, Feb. 8: During the past week ore shipments were made from the mines of the district as follows: To the Richmond Co.—Dunderberg mine, 18 tons; Jackson mine, 22 tons. Eureka Con.—David Lindsey, 14 tons; Oriental and Belmont, 32 tons.

#### Seligman District.

**IMPROVING.**—*Carson Tribune*, Feb. 11: The mines in Seligman district, White Pine county, show steady improvement, and Manager Robinson is pushing things for all they are worth. He is putting up the largest concentrating-mill on the coast; in all its details one of the most thorough and complete of its kind, which will have a capacity of 100 tons. There is no lack of ore. The ledge is 6000 feet long and varies in width from 4 to 40 feet, with the grade of ore improving as depth is attained. Seligman now gives promise of being the big camp of the country.

#### ARIZONA.

**HOWARD.**—*Prescott Courier*, Feb. 11: The Howard mine, Hassayampa district, continues to produce very rich gold-bearing rock. D. W. Clearwaters was in the mine yesterday; the bottom of the shaft is about 40 feet below the surface; in it free gold is everywhere to be seen in the vein. They had 33 sacks filled with the richest rock. Work in the tunnel was progressing. Mr. Turner of Big Bug district is in town. He met Mr. Cartmell on the trail. He was going to fix the Schofield mill. A. D. Whitney of Walker district, brought in about

a ton and a half of ore for Moore & Doggett. They have 40 or 50 tons of rich ore ready to be hauled, and are every day taking out more. It was rumored here yesterday that the Standard mill will start on its first run this morning. Chances are that 9, maybe 10, mills will be running in this section next summer.

**STRIKE.**—*Clifton Clarion*, Feb. 10: An important strike was made the past week in John H. Hovey's Coon mine on Chase creek. The owners have for some time been engaged in running a tunnel between two ledges on the claim, with the intention of crosscutting at 100 feet. The proposition has met with flattering success, and after running the tunnel the above distance the crosscut in one direction has cut a splendid ledge of ore which shows free gold of the same character as that which was obtained from the croppings and which caused such excitement when displayed about town. The owners are now in three feet on this ledge and are not yet through it. This tunnel gives to the workings where the strike was made a depth of about 80 feet from the surface. As soon as the full width of this ledge is arrived at the crosscut will be driven in the other direction for the purpose of cutting the other ledge.

**ORE.**—About 15 tons of ore from the Wonderful claim of the Friend Bros. were shipped the present week to the Rio Grande Smelting Works at Socorro, N. M. Yesterday morning 50 sacks of ore from McCarty's Lucky Jim mine at Gray's peak were shipped to El Paso.

**BIG BUG DISTRICT.**—*Prescott Courier*, Feb. 12: Douglas Gray of Big Bug district is here feeling as if bonanzas in his camp "speak for themselves," which they do. We hear that John S. Jones wants to purchase ore on dumps for his Standard mill. W. W. Davis and Dan Hatz of Slate creek have a carload of rich ore ready to ship. Jos. Campbell told us yesterday that he will shortly commence packing 400 tons of ore from Hassayampa district to the Standard mill, Groom creek. E. M. Clark yesterday purchased the Queen Company's property, Groom creek district, for his brother, Mr. Raymond, just from same district, reports deep snow in the mountains. He was told that Moore & Doggett had \$30,000 worth of ore in sight in their mine. Talk is that Bigelow & Smith have very rich gold rock in their mine. Rock said to be as rich as that of the Howard.

**TOMBSTONE NOTES.**—*Epitaph*, Feb. 11: The seventh level (just above water) has been started in the Emerald mine, one of the principal properties of the Grand Central Co. The ore produced is somewhat higher grade than in the upper levels, and the condition of the mine was never so good. At water level in the Boss, another Grand Central producer, a body of very high-grade ore was found to continue below, but further developments in that direction must await the resumption of pumping operations. Sufficient ore is being produced from the various properties of the Grand Central Co. to keep 20 stamps continually pounding away. Developments in the different levels and stopes of the Old Guard are very encouraging, and furnish more than sufficient ore to keep the mill constantly at work. Recent developments in the Lucky Cuss, which mine is likely to bring the T. M. & M. Co. out all right, have been of a very important character. It is said that at 300 feet, a magnificent body of high-grade ore has been encountered, the size of which has not been ascertained. The Telephone mine, owned by J. Murray Bailey, some three months ago was leased to Messrs. Hughes and others for a term of 12 months. Recently they developed an extensive body of high-grade manganese ore, which they are shipping to Socorro at a good profit.

#### COLORADO.

**KEYSTONE.**—*Elk Mountain Pilot*, Feb. 9: The Keystone mine just above town, near the Iron Swamp, is attracting some attention. This claim was located several years ago by Mr. Williamson. The main vein is several feet in width and a large quantity of ore has been encountered within the last few feet. This ore is as yet quite refractory, as it has a large amount of zinc blende and iron pyrites mixed with the galena and copper pyrites. It is not unlikely this zinc and iron will disappear as the work advances and probably be replaced by the galena coming in solid. The recent big strike in the Bonny Belle mine at grass roots in Aspen is another proof that deep mining is not always necessary to secure rich ore in Colorado. It should also be an incentive to prospectors for a more thorough and careful examination of the mineral outcrops and surface exposures in the mining sections. The force on the Daisy in Redwell will soon be increased and ore shipment possible. The Anthracite Mesa coal mine has nearly doubled its output since the completion of the mine tramway by which the loaded cars are let down the incline of the main entry, and the empties going up at the same time. The expense of mules and drivers is dispensed with, while the hauling capacity is greatly increased.

#### DAKOTA.

**ELK MOUNTAIN.**—*Deadwood Pioneer*, Feb. 8: Superintendent Barry of the Elk Mountain paid a business visit to the metropolis on Tuesday, and says that work progresses favorably. The company has already shipped one carload of ore to the Omaha reduction works, from which, however, returns have not as yet been received. The force employed is working on ore now, and extracting a considerable amount for each shift worked. Tuesday, the first installment, about 2 tons, toward the second carload left the mine on wagons for Sturgis City and the railroad. The average value of the ore is about \$60 per ton.

**PLANET.**—Good reports from the mine are received. The ore body encountered some days ago continues to enlarge as work progresses. Pay prospects from any portion of the vein show that the gold is equally distributed throughout the entire ledge. The mine will be thoroughly opened in the spring. A number of wagons laden with coke for the Iron Hill smelting works passed through the city Tuesday.

#### IDAHO.

**THE WAR DANCE GROUP.**—*Inter-Idaho*, Feb. 8: Edward Flannery is down from Deer creek with a

12 tons shipment of fine ore. He and Jas. W. Burns are equal owners in the War Dance group of mines, which are located about 8 miles from Hailey, and a mile from Bolton's hot springs. The War Dance, which is the best developed mine of the group, has 3 tunnels. Nine men are employed on it this winter. The middle tunnel has an ore chute 240 feet long, going both up and down. The owners are drifting both ways and still have ore in the headings of both drifts. The ledge is from two to four feet wide and will average from 100 to 135 ounces in silver, and from 70 to 75 per cent in lead. Some choice specimens of gray copper go as high as 3000 ounces. Very little stoping has been done, most of the ore having been taken out of the drifts. When the roads are opened so that timbers can be hauled, stoping will be commenced. The lower tunnel is in 60 feet. It is expected to cut the ledge in about two months. The ore grows richer in depth. In the lower tunnel considerable gray copper and sulphurates have been found. Some of it looks almost like bullion and assays as high as 2860 ounces in silver. The upper tunnel has been driven in 400 feet, 300 feet being on the ledge. Considerable ore is showing up in it. The Emery mine, which joins the War Dance on the northwest, has a tunnel 450 or 500 feet in length, with several upraises to the surface. It contains two big chutes, 150 feet long; one being 3½ feet thick, the other 4 feet and two inches. There is plenty of ore in the bottom of the drift, but, instead of working it from above, it is intended to work it through the War Dance tunnel from below.

**ABOUT THE MINES.**—*Bellevue Herald*, Feb. 9: With to-night's shifts all the old forces will be at work in the Minnie Moore, Relief and Queen of the Hills, or as near as they can be arrived at. In all, between 180 and 200 miners and mill men will tomorrow be on the pay-rolls, and from the way that the managers speak, ore will soon be hoisted as never before from the great Galena-gulch mines one mile west of Bellevue.

**CAMAS NO. 2 RUMOR.**—In Bellevue the rumor has gained circulation that the Camas No. 2 gold-belt mine had been sold to a company made up of the "Bonanza Kings," the price of the sale being \$500,000, three-fifths cash. The rumor also states that work may be looked to in a gigantic way, but what truth there is in the matter we are unable to say. To have such operators as Fair, Mackay, Stewart, or men of their reputation take hold of the gold belt it would be a boom for this entire section.

#### MONTANA.

**ARGENTA MINES.**—*Inter-Mountain*, Feb. 7: News from the Argenta mining district indicates that the coming spring will see quite an old-time boom, and from the finds that are taking place there and the developments that are being quietly pushed forward on certain claims, it seems more than probable the miners in this once prosperous district will be rewarded liberally for the determination, pluck, and energy displayed. Two claims owned by A. V. Clark and some parties in Butte are properties of valuable promise. A good strike was made in the Eureka last week of galena, which carries 98 ounces of silver and 70 ounces of lead, and there is every indication that future developments will disclose some still higher grade ores.

**RUNNING WOLF.**—*Cor. Butte Miner*, Feb. 11: In looking up a railroad route from Great Falls to Neilant it came to my knowledge that a new mining camp, called Running Wolf mining district, Fergus county, about 13 miles from Stanford, is coming to the front. There are several claims patented in the district, two of them the Mystery and Sir Walter Scott lodes by Paris Gibson. I am told there will be extensive mining operations in the new camp next summer. The leads run from 3 to 30 feet in width, and are rich in silver and copper. There is abundance of timber and water in the vicinity. Several large bodies of coal have been struck, and there is unlimited iron ore in the district.

**SHUT DOWN.**—*Butte Miner*, Feb. 8: The Hope mine shut down yesterday and all hands were discharged except two, who will keep the pumps running. The cause of the close-down is that the mine is mismanaged by parties in the East. Nothing has been done in the mine except by direction from the East, and the directions were in general just the contrary of what would have been given if the foreman if he had been permitted to work the mine according to his own judgment, which would have brought out the best results. Whenever a body of ore has been struck in the mine the whole force has been concentrated upon it and all development work suspended. The consequence was that when the bunch of ore was worked out the mine was practically valueless, for there was no development or prospecting for other ore bodies. As it stands now the western part of the claim is almost unprospected, and no one can tell whether it is working or not. A gentleman from Deer Lodge informs the *Miner* that the new steam hoisting works on the Champion Consolidated Company's mine Lily are now complete and ready for business, with a capacity to sink 600 feet. A contract has been made with a Mr. Doyle of this city to sink the first 100 feet. He believes the mine will soon be counted among the prominent producers. The Mountain Lion tunnel was completed a couple of days ago, striking a body of rich ore, of which an assay returned 731½ ounces of silver. The owners of the property are naturally very jubilant.

#### NEW MEXICO.

**GOLD HILL.**—*Cor. Silver City Enterprise*, Feb. 10: While the district is not booming it is progressing in a slow but sure way, and all who have worked their claims intelligently have a good prospect of being rewarded for their labor. The Yankee Girl, which has yielded a large amount of ore, and is being worked with marked success, has developed into a mine. Farther west and bordering on the same dyke of porphyry, Kellum & West have sunk a shaft 60 feet deep on the Minneapolis, and are now grading a road to ship ore, which contains sulphides richly intermixed with native silver. Andy Sawyer discovered last week a blind lead of very rich gold rock. Gray sent a lot of ore to Mr. Knott's arastra east of here and secured \$60 per ton in gold, which has induced him to erect an arastra of his own. Mr. Utter is working six men. He will start his mill again soon, as he will have plenty of water. McDowry is sacking ore for another shipment. He expects to realize from \$125 to \$175 per ton. A cus-

tom mill is what we now need most. It could make money and give the miners means to develop their properties, and at the same time be a source of revenue to the county at large.

**SOCORRO.**—*Bullion*, Feb. 11: The Socorro mountain excitement still continues and a number of prospectors are searching for the hidden treasure. Day and Green brought some fine-looking specimens to the city this week, and, to all appearances, these gentlemen have struck a good and lasting body of mineral. L. L. Howison was also showing some good rock, and it is the general impression that our old mountain will yet prove to be of great value. Col. Eaton made another shipment of ore from his Magdalena mines to the Graphic this week. Another lot of rich ore was brought in, a few days ago, from the Comromise, located at Hansonburg and owned by Blanchard and Reynolds. This property is now down about 65 feet and grows richer every foot. We are informed by one of the parties interested in the Torrence that it is the intention of the owners of this mine to begin sinking a shaft shortly. The recent strikes further up the mountain have created confidence in the Torrence. A force of men will soon be put on the old Boss mine, located in the Galinas. This property, which is owned by Catron & Wilson of Santa Fe, is one of the richest in the country. It is said that \$42,000 worth of ore is now on the dump ready for shipment.

#### OREGON.

**PLACER AND QUARTZ.**—*Jacksonville Times*, Feb. 11: Some gold-dust is being brought to town. Miners are still very busy, but are not at all pleased with the present beautiful weather. O'Brien & Berryman of Applegate have their hydraulic in operation, and will make a good run. The miners of Josephine county have an abundant supply of water, and most of them will do well this season. John Atteberry and J. D. Matney of Forest creek are moving considerable ground, and have good prospects. J. T. Layton of Applegate is getting ready for the season's run, and will commence operations in a few days. Some of the miners are ready for more rain, as the warm weather during the day, and the heavy frost at night, have already lessened the supply of water. A shaft 75 feet deep has already been sunk on the Eureka mine, owned by J. S. Urquhart of Gold Hill. Coulter & Son are also forwarding work on their tunnels. Although the season for such things is rather early, much prospecting is going on in the vicinity of Gold Hill. This is destined to be an important mining camp in the near future. Salmarsch, Yaudes & Co. have sold their mines in Sterlingville precinct, which are known to be rich, to Henry E. Ankeny of Marion county, son of Capt. A. P. Ankeny. Consideration, \$20,000. Coulter & Son's quartz-mill, which laid idle during the cold spell of weather, has been running on full time during the past fortnight, and doing good work. There is a large amount of good quartz still on the dump.

**MINERAL CITY.**—*Cor. Badrock Democrat*, Feb. 8: There is nothing doing here at present. Only about ten or twelve men in camp. There have been no sales made yet and we do not think there will be soon, as none of the experts that have been in here have had any capital to operate with. They come in here with a business-like air, and one would think they intended to buy out the whole camp; but when you come to find them out they haven't got one dollar of their own, and are only trying to catch on to other people's property and make a few dollars. They always fail and that keeps our camp back. Mining claims are very cheap here, and if the right man would happen along with money, who meant business, he could buy out the camp cheap by paying cash down. We are all tired of the bonding business, for it never amounts to anything. The snow is about a foot deep on an average and is melting off fast. I think stock would do better in this part of the country than the miners; for none of the miners in this camp have ever made any money since they came here, and I am one of the number.

#### UTAH.

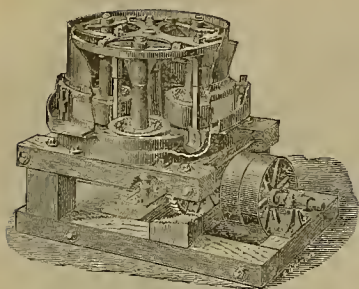
**OPHIR.**—*Salt Lake Tribune*, Feb. 10: The Gem mine, Ophir, is employing 12 men in extracting a little ore and in making a connection between two levels that are 540 feet apart, of which 400 feet has been completed, and the connection is expected to be made within the next 30 days. This will open up the mine in good shape to a depth of about 800 feet. This connection is made by following down on the ore chute, which is from two to five feet wide, carrying ore running from 40 to 500 ounces silver and but little lead. The Brimm Bros. are preparing to make extensive shipments from their property on Lion Hill, Ophir. The Honerine tunnel, Stockton, is being pushed ahead rapidly since starting the new machinery, which works very satisfactorily.

**THE DIAMOND QUARRIES.**—*Salt Lake Tribune*, Feb. 4: The Diamond, Beaver & Castle Stone Co. is making preparation for extensive operations this year. They own quarries at Diamond, near Thistle, on the D. & R. G. R., where there is an immense quantity of brown stone like that in the Cullen hotel front, another quarry at Kyune, four miles east of Pleasant Valley junction, producing a gray sandstone, and another at Castle Gate, that has various thicknesses or layers of fine, hard, drab stone suitable for building, flagging, etc. They own 40 acres at each place, have in side tracks, derricks, etc., and are now arranging to put in steam drills to expedite work. It was only last year that these quarries were opened by Lawrence & Hammill, the owners, and yet they have shipped a large amount from each of the three places. An order of 60 carloads for Denver from the Kyune quarry is about filled. Last year they sent out over 200 carloads to points in Utah and Colorado, with a few carloads going to Kansas. The prospect for a big business this year brightens with the many inquiries they are receiving, and the assurance of extensive building operations in this city at no distant day.

**A HUGE COAL VEIN.**—The Sunnyside coalmen have penetrated 51 feet in one vein, where they find coal which they claim beats any coal hitherto produced in the West.

**THE ASPHALTUM WORKS.**—*Provo American*, Feb. 3: Mr. Le Sieur has received notice from his St. Louis Co. that the bids for the construction of the building for the asphaltum works at Tishie have been awarded to Mr. O. H. Berg. Mr. Berg will begin operations at once.



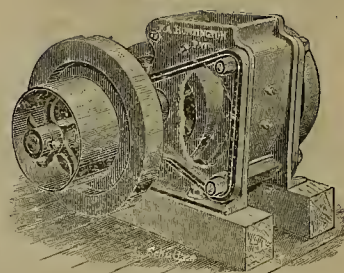


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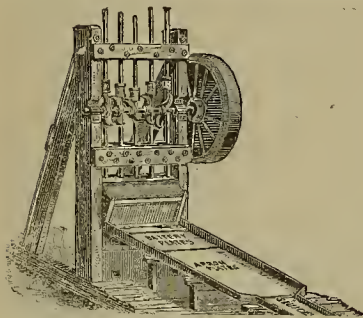
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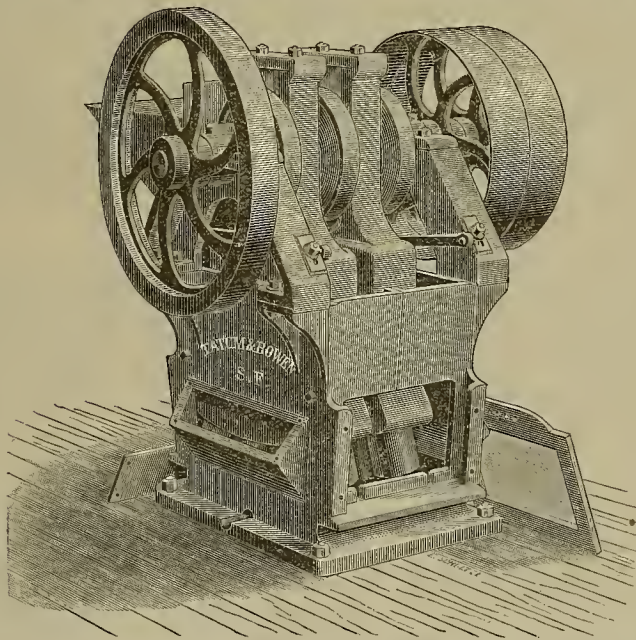
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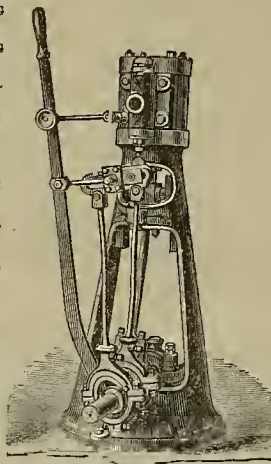
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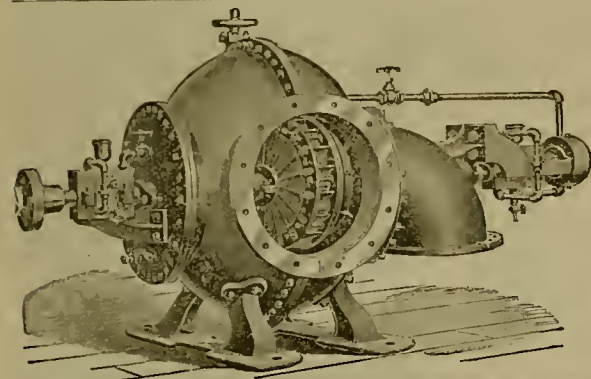
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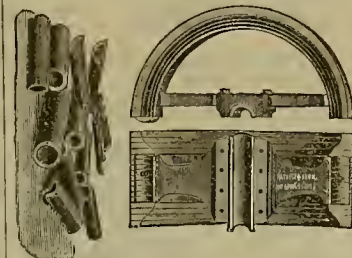
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The Late A. J. Stevens.

In the death last week of A. J. Stevens, who has been for many years master mechanic of the Southern Pacific Co., the community and the company lose a most useful and talented man. He has been connected with railroads in various capacities nearly all his life, and had finally attained a position of great responsibility and prominence. He had charge of the great railroad-shops at Sacramento, and it was due to him that they grew to the present magnitude. He convinced the railroad management that it was possible for the company to build their own locomotives, with the result of giving employment on this coast to thousands of skilled mechanics.

The large engines used on the Oakland local tracks were of his design, and he also designed the Governor, the heaviest locomotive in the world, which is used at Tehachapi. Mr. Stevens also planned the machinery for the large ferry-boats Piedmont and Solano. He perfected many inventions for which he obtained patents. Among these the valve motion for engines now used on the locomotives of the S. P. Co.; the apparatus for burning crude petroleum, in use on the ferry steamers; a boiler, a feed-water purifier and others. Aside from his patented inventions he introduced many improvements and made many experiments for the more practical working of the mechanical departments over which he presided.

Mr. Stevens, as may be seen from what has been said, was a talented and skilled mechanic and an ingenious inventor. He was very practical in everything, and was highly respected by his men. On the day of his funeral the railroad shops at Sacramento were closed, and upward of 1500 mechanics escorted the remains to the church. The interment was at Oakland on the following day. The floral designs were numerous and varied, many of them being of very original design. The employees of the machine-shop sent a floral representation of Engine 48, that being the locomotive in which Mr. Stevens' patent valve motion was first applied. The floral representation of a sleeping-car from the car department was an elaborate design. A hoiler, five feet in length and standing five feet high, was the floral offering of the employees of the hoiler-shop. The fire-hox was of variegated pantries and the hoiler of blue violets. Over the hoiler were the letters, "A. J. S.," worked in violets, and beneath, the words "Our Tribute." A large broken driving-wheel was the offering of the foundrymen. A large-floral representation of the steamer Modoc was an offering from the Oakland employees of the Southern Pacific railroad. It was three feet long and about four feet high. A large floral steam hammer was the offering of the employees of the blacksmith-shop, while that of the machine-shop was a mammoth and magnificent floral representation of the ferry steamer Piedmont. The blacksmith-shop also sent a floral anvil and hammer. At the head of the casket and resting on the floor was an elegant floral offering, representing the gates ajar. This, as also the beautiful broken column at the opposite end of the casket, was sent by E. C. Fellows Lodge, Brotherhood of Locomotive Engineers. A hesutiful design, representing the badge of the Order, was contributed by the Brotherhood of Locomotive Engineers. A number of other designs were sent by individual friends of deceased.

New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco: PUTAH CREEK COAL, IRON AND MANGANESE Co., Feb. 14. Object, to locate, buy, sell develop and improve coal, iron, manganese and other mines, and in order to do so, also to operate all kinds of roads, vessels, steamers, and colliers. Capital stock, \$1,500,000. Directors—Thomas K. Davidson, W. C. Curtis, Joseph Craig, Frank Shay and B. F. Tuttle. SNOW MINING AND DITCH Co., Feb. 14. Location, Iowa/ile district, El Dorado Co. Capital stock, \$500,000. Directors—John Landers, Hermann Zidig, S. P. Middleton, Alex. D. Sharon and T. J. L. Smiley.

Mining Share Market.

There is no great range of fluctuations in prices of stocks in these days, and not very much interest in the market. Nevertheless, the ore-producing sections of all the leading Comstock mines are looking well, and there is more ore already out and awaiting milling than at any one time in the past ten years.

The Enterprise says that there will be no falling off in the amount of Con. Cal. and Virginia ores reduced, and no passing of dividends. The California pan and stamp mills will be shut down for four or five weeks during the necessary alterations in the apparatus for the transmission of power, but it is better to make the required alterations at once than to attempt to run with the old cables and gear, the liability to frequent stoppages being considered. W. R. Eckert, an old-time Comstocker, and one of the most reliable and accomplished machinists and engineers on the Pacific Coast, will at once proceed to solve the problem as regards the proper form and position of the pulleys to be used with the new cables. The middle mines

are extracting all the ore that can be reduced, and at the same time are making valuable new developments. The Gould and Curry is again becoming an ore producer, and already has on hand a considerable amount of ore that will be worked as soon as milling facilities are obtainable.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING FEBRUARY 7, 1888.

- 377,553.—ELECTRIC GAS LIGHTER.—Julius Finck, S. F.
- 377,584.—STATION INDICATOR.—E. S. Irvin, Berkeley, Cal.
- 377,593.—BRIDLE WINKER ATTACHMENT.—E. B. Knapp, San Jacinto, Cal.
- 377,525.—SEWING MACHINE.—M. Lachman, S. F.
- 377,527.—CABLE RAILWAY GRIP.—D. S. Mackey, S. F.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SEWING MACHINE.—Morris Lachman, S. F., assignor to Commercial Oversewing Machine & Manufacturing Co. No. 377,525. Dated Feb. 7, 1888. This invention relates to certain improvements in sewing machines, and comprises a mechanism which is intended to form a stitch to be used in making grain and other bags. It consists in the combination, with a vertically moving needle, of a peculiarly shaped semi-rotating or oscillating looper, an arm or finger to hold the thread upon the looper and a mechanism by which these parts are actuated.

CABLE RAILWAY GRIP.—David S. Mackey, S. F. No. 377,527. Dated Feb. 7, 1888. This improvement in cable grips consists in such a construction of the lower movable jaw of the grip, in connection with an adjustably-moving fulcrum and the sliding-plate to which the jaw is hinged, that it may be thrown down and swung entirely out of the way of the rope in case of obstruction or accident, and it may be brought up in such a manner as to seize the rope whenever desired. By the construction patented the rope may be dropped at any time and picked up easily, as the sweep of the lower jaw in closing will always take hold of the rope and bring it to its proper position between the two.

CAN-CRIMPER AND CAPPER.—Mathias Jensen, Astoria, Oregon, assignor of one-half to Jensen Can-Filling Machine Co. of same place. No. 376,804. Dated Jan. 24, 1888. This apparatus is specially intended to receive cans which have been filled with fish or other material, and by means of a belt and a feeder or carrier to transfer them to a point where they receive a cap, and afterward transfer them still farther to a crimper, by which the caps are crimped in place upon the can, the latter being discharged after the completion of the operation, and delivered into a conveyer which carries them to the machine for applying the acid to solder the covers upon them.

ELECTRIC GAS LIGHTER.—Julius Finck, S. F. No. 377,553. Dated Feb. 7, 1888. The invention relates to that class of electric gas-lighting apparatus in which the magnet and connected parts and the circuit-breaker and its contact point by which the spark is effected, are all placed in close proximity to the burner usually surrounding it and practically, if not actually, formed with it; and the object of the invention is to provide an apparatus of this class which, by reason of its construction, may be readily applied to any form of gas-burner, requiring no special previous construction to adapt it to this end. The invention consists in a frame which carries the magnet, the circuit-breaker, and all the customary parts of such apparatus, said frame having a means—such as an arm projecting from its top end formed with a collar which fits over the burner—for readily attaching the apparatus to the burner, the frame being placed in such a position that its sparking devices shall be in proper relation to the end or tip of the burner.

THE ADAMANTINE SHOES AND DIES (see advertisement next page this number) are manufactured by Chrome Steel Works, Brooklyn, N. Y.; H. D. Morris, 18 Fremont St., this city, agent. These shoes and dies are now largely used by stamp-mills throughout the coast with most satisfactory results, the metal from which they are made, chrome steel, being peculiarly adapted to such work. It is both hard and strong, and the castings made from it are entirely free from blow-boles, being as perfect in this respect as the best iron castings. In consequence of this they wear evenly throughout their use, and are very durable. As regards durability, they are guaranteed to equal three sets of cast iron. Orders, subject to above guarantee, are respectfully solicited.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

ASSESSMENTS.								
COMPANY.	LOCATION.	NO. AMT.	LEVIED.	DELINQ'T.	SALE.	SECRETARY.	PLACE OF BUSINESS.	
Alpha Con M Co.	Nevada.	1.	25.	Jan 9.	Feb 15.	Mar 6.	C E Elliott.	309 Montgomery St
Best & Belcher M Co.	Nevada.	39.	50.	Jan 4.	Feb 9.	Mar 2.	L Osborn.	309 Montgomery St
Baker Divide M Co.	California.	15.	25.	Jan 7.	Feb 13.	Mar 29.	D M Kent.	320 Pine St
Bodie Con M Co.	California.	8.	50.	Feb 13.	Mar 20.	Apr 28.	G W Sessions.	308 Montgomery St
Crown Point G & S M Co.	Nevada.	48.	50.	Jan 4.	Feb 5.	Mar 23.	J Newman.	323 Pine St
Chollar M Co.	Nevada.	21.	50.	Dec 5.	Jan 10.	Jan 31.	C E Elliott.	319 Montgomery St
Commonwealth Con M Co.	Nevada.	6.	50.	Dec 29.	Feb 6.	Feb 28.	H Deas.	308 Montgomery St
Comet Con M Co.	California.	4.	3.	Jan 6.	Feb 17.	Mar 14.	H Lacy.	321 California St
Obamption M Co.	California.	23.	15.	Jan 14.	Mar 19.	Apr 16.	T Wetzel.	522 Montgomery St
Eva Con M Co.	Nevada.	1.	15.	Jan 5.	Feb 10.	Mar 5.	J Stadfeld Jr.	522 Montgomery St
Eschquer M Co.	Nevada.	25.	20.	Feb 7.	Mar 17.	Apr 4.	C E Elliott.	333 California St
Flower M Co.	Nevada.	5.	20.	Jan 13.	Feb 17.	Mar 9.	L P Holden.	113 Leidesdorff St
Found Treasure M Co.	Nevada.	2.	06.	Jan 31.	Mar 9.	Mar 28.	J Stadfeld Jr.	419 California St
Gray Eagle M Co.	California.	2.	14.	Jan 4.	Feb 10.	Mar 3.	T Wetzel.	522 Montgomery St
Genesee M Co.	Nevada.	1.	03.	Jan 10.	Feb 14.	Mar 6.	E F Stone.	306 Pine St
Golden Fleece G M Co.	California.	12.	7.	Jan 28.	Mar 15.	Apr 10.	W J Gleason.	310 Phelan Building
Heath M Co.	Idaho.	3.	05.	Feb 8.	Mar 19.	Apr 13.	W L Oliver.	323 Montgomery St
Live Oak Drift G M Co.	California.	3.	10.	Feb 13.	Mar 20.	Apr 14.	T Wetzel.	522 Montgomery St
Mayflower G M Co.	California.	40.	50.	Jan 17.	Feb 23.	Mar 16.	J Moritz.	323 Montgomery St
Mexican G & S M Co.	Nevada.	35.	25.	Jan 17.	Feb 21.	Mar 13.	C E Elliott.	308 Montgomery St
Manhattan M Co.	Nevada.	7.	1.	Dec 9.	Jan 12.	Jan 31.	J Crockett.	327 Pine St
Mono G M Co.	California.	25.	50.	Dec 20.	Jan 24.	Feb 28.	G W Sessions.	308 Montgomery St
North Bonanza M Co.	Nevada.	15.	15.	Jan 10.	Feb 10.	Mar 14.	J J Scoville.	522 Montgomery St
Nevado M Co.	Nevada.	13.	35.	Jan 10.	Feb 14.	Mar 13.	G W Pew.	310 Pine St
Paradise Valley M Co.	Nevada.	4.	10.	Jan 28.	Mar 1.	Mar 23.	W L Oliver.	328 Montgomery St
Quartz Mt G M Co.	California.	20.	70.	Jan 17.	Feb 20.	Mar 15.	E Hestres.	317 Sansome St
Santa Fe M Co.	Nevada.	90.	25.	Dec 7.	Jan 11.	Jan 30.	E L Parker.	309 Montgomery St
San Francisco Copper M Co.	California.	2.	50.	Jan 1.	Mar 18.	Apr 18.	H F Bohr.	320 Sansome St
S F Copper Co.	Nevada.	2.	40.	Feb 3.	Mar 10.	Apr 3.	H Pichoir.	320 Sansome St

MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING DATE
North Peer M Co.	Arizona.	H Deas.	309 Montgomery St.	Annual. Feb. 24
Watt & B. Gravel Co.	California.	C C Cox.	309 Montgomery St.	Annual. Feb. 20
West Comstock M Co.	Nevada.	T W Nowlin.	520 Montgomery St.	Special. Feb. 18

LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A W Havens.	309 Montgomery St.	50.	Feb. 10
Eureka Con M Co.	Nevada.	H R P Hutton.	306 Pine St.	25.	Feb. 25
North Belle Isle M Co.	Nevada.	J W Pew.	310 Pine St.	50.	Feb. 2
Russell Reduction & M Co.	California.	J Moritz.	323 Montgomery St.	05.	Sept. 17
San Francisco Copper M Co.	California.	E Berier.	320 Sansome St.	05.	Oct. 10
Standard Con M Co.	California.	J W Pew.	310 Pine St.	05.	Jan. 12

San Francisco Metal Market.

WHOLESALE.		THURSDAY, Feb. 16, 1888.	
		94 @ —	
ANTIMONY—French Star.	26 @ 30		
COPPER—			
Bolt.	26 @ 30		
Sheeting.	26 @ 30		
Ingot.	16 @ 18		
Fire Box Sheets.	25 @ 28		
Iron—Bengalton ton.	— @ 20		
Elgin ton.	— @ 20		
American Soft, 1 ton.	— @ 35		
Oregon Pig ton.	21 @ 23		
Clay Lane White.	23 @ 25		
Shots, No. 1.	31 @ 33		
Lead—Pig.	5 @ 5.50		
Bar.	5 @ 5.50		
Sheet.	3 @ —		
Shot, discount 10% on 500 bag.	Drop, 9 bag.	1 @ —	
Buck, 9 bag.	1 @ —		
Chilled, do.	1 @ —		
STEEL—English, lb.	16 @ 25		
Black Diamond, ordinary sizes.	9 @ —		
Plow.	4 @ 5		
Machinery.	10 @ 16		
TINPLATE—Coke.	5 @ 5.50		
Orchard.	6 @ 7.25		
QUICKSILVER—By the Bask.	42 @ 00		
Flask, new.	1 @ 05		
Flask, old.	85 @ —		

New York Metal Market.

Telegraphic advices dated Feb. 16th give the following New York prices: BAR SILVER—95 1/2 per oz. BORAX—94 @ 95. COPPER—LARK—\$16.40 @ —. IRON—No. 1, \$22.00. LEAD—\$4.92 1/2. Tin—\$3.85. The following is the latest by mail from the "New York Metal Exchange Market Report": COPPER—Livestock spot closing at \$16.90 @ 17.10. Transferable Notices (Lake) issued at \$16.90 @ —. LEAD—Quiet at \$4.70 @ 4.76 spot. Transferable Notices issued at \$5.00. TIN—Dull at \$38.00 @ 37.00. Transferable notices issued at \$34.00. MAKERS' PRICES—At tide water. 100-ton lots of listed irons (when brand is specified) range nominally about as follows: Lehigh, Grade No. 1, \$20.50 @ 21.00; No. 2, \$19.50 @ 20.00; Grey Forge, \$17.00 @ 17.50; Hudson River, Grade No. 1, \$20.50 @ 21.00; No. 2, \$19.00 @ 20.00; Grey Forge, \$17.50 @ 18.00; Southern, Grade No. 1, \$20.00 @ 21.00. No. 2, \$18.50 @ —; Grey Forge, \$17.00 @ —. Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, \$37.00 @ 37.50; Billiton Tin, \$37.00 @ 37.50; Banca Tin, \$38.00 @ —; Baltimore Copper, \$14.75 @ 15.25; Orford Copper, \$15.50 @ 16.00; P. S. C. Copper, — @ —; Foreign Lead, \$5.40 @ 5.50; Foreign Spelter, \$6.10 @ 6.30. Antimony, \$11.50 @ 12.00.

Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports: SAVAGE (for January), \$40,000; Hale and Norcross (for January), \$35,000; Standard, Feb. 14, \$15,705; Con. Cal. and Virginia, 12, \$153,915; Lexington, 10, \$23,608; Blinbird, 10, \$16,352; Hananer, 7, \$2000; Germania, 7, \$3089; Germania, 9, \$1650; Hanauer, 9, \$3950; Queen of the Hills, 9, \$1000; Pascoe, 9, \$1270; Hananer, 10, \$2000; Germania, 11, \$3475; Hanauer, 11, \$1005; Crescent, 12, \$3700; Hanauer, 12, \$2200. The shipments of base bullion and ore from Salt Lake, for the week ending Feb. 12th, were 21 cars bullion, 509,620 lbs.; 29 cars silver and lead ores, 880,530 lbs.; 4 cars copper ore, 113,400 lbs.; 1 car matte, 37,500; total, 1,541,050 lbs.

Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

WANTED—A first-class Gold Mine, or one producing Gold and Silver. Address, stating location, price, etc., F. A. B. Box 2361, San Francisco, Cal.

Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Jan. 25.	WEEK ENDING Feb. 2.	WEEK ENDING Feb. 9.	WEEK ENDING Feb. 16.
Alpha.	1.45	2.40	2.10	2.50
Alta.	1.80	2.35	2.00	2.15
Andes.	1.20	1.40	1.25	1.40
Argenta.	—	—	—	—
Bachelder.	5.50	6.10	5.35	5.75
Best & Belcher.	5.50	6.50	5.60	6.50
Bullion.	1.50	1.70	1.60	1.80
Baltimore.	—	—	—	—
Bodie.	2.45	2.55	2.30	2.60
Benton.	—	—	—	—
Bodie Tunnel.	—	—	—	—
Bulwer.	—	—	—	—
Challenge.	3.70	4.00	3.50	4.00
Champion.	—	—	—	—
Chollar.	5.75	6.50	6.00	6.25
Confidence.	—	—	—	—
Con. Imperia.	2.75	3.25	3.50	3.10
Caledonia.	—	—	—	—
Con. Pacific.	—	—	—	—
Crown Point.	5.50	6.10	5.80	6.25
Centra.	—	—	—	—
Dudley.	—	—	—	—
East B. & B.	—	—	—	—
Eureka Con.	9.50	10.10	9.50	10.10
Excelsior.	1.15	1.50	1.20	1.40
Grand Prize.	1.10	1.35	1.20	1.40
Gould & Curry.	4.40	5.00	4.50	5.25
Hale & Norcross.	9.00	10.75	9.50	10.50
Holmes.	—	—	—	—
Independence.	—	—	—	—
Iowa.	—	—	—	—
Julia.	4.50	5.00	4.50	5.00
Justice.	—	—	—	—
Kentuck.	2.30	2.75	2.50	2.80
Lady W.	—	—	—	—
Martin White.	—	—	—	—
Mono.	2.00	2.20	2.15	2.40
Mexican.	4.45	4.75	4.70	5.00
Mt. Diablo.	—	—	—	—
Northern.	—	—	—	—
Nevado.	1.10	1.40	1.35	1.60
North Belle Isle.	8.00	8.40	8.10	8.75
Nisarga.	—	—	—	—
New Queen.	2.75	3.15	3.00	3.70
Old G. & C.	—	—	—	—
Occidental.	1.50	1.90	1.60	1.80
Ophir.	3.00	3.40	3.25	3.40
Overman.	1.80	2.15	2.00	2.40
Potosi.	5.50	6.10	5.75	6.50
Pacific.	1.75	1.95	1.85	2.15
Perr.	—	—	—	—
P. Sheridan.	—	—	—	—
Sage Star.	—	—	—	—
Savage.	7.25	8.00	7.75	8.50
Sierra Nevada.	4.30	4.95	4.65	5.25
Silver Hill.	—	—	—	—
Silver King.	—	—	—	—
Sonoma.	—	—	—	—
Syndicate.	—	—	—	—
Union Con.	4.00	4.50	4.25	4.75
Utah.	1.60	1.85	1.75	2.00
Yellow Jacket.	7.50	8.25	7.75	8.50

Sales at San Francisco Stock Exchange.

THURSDAY Feb. 16, 1888.	
200 Alta.	2.15
300 Andes.	1.20
300 Argenta.	—
210 B. & Belcher.	5.50
150 Bodie.	2.30
300 Bodie.	2.30
100 Bodie.	2.30
200 Bodie.	2.30
150 Chollar.	5.75
310 Con Va & Cal.	1.75
350 Crown Point.	1.25
300 Confidence.	—
50 Con. Imperia.	—
190 Eureka Con.	9.50
75 Gould & Curry.	4.40
700 Grand Prize.	1.10

Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by sending Agents in their labors of encouraging and aiding their friends and encouraging favors. We intend to send none but worthy men. F. B. LOGAN—Santa Clara Co. JOHN G. H. LAMPADUS—Monterey Co. G. W. INOUE—Arizona Territory. WM. WILKINSON—Stanislaus and Merced Co.'s. A. F. JEWETT—Tulare Co. C. E. WILLIAMS—Yuba and Butte Co.'s. R. G. HUSTON—Montana Territory.

WORKING ORE.—Miners who want a quartz-mill, large or small, at one-eighth the cost of stamps, should investigate the new Stiles pulverizer and concentrator, both fully tested, and which are going to get to the front and stay there. Address J. A. Johnson, 105 Stockton St., San Francisco.



## About Obtaining Patents.

### Patents are Virtually Contracts.

The Patent Law provides that in case a patent, which is the evidence of the contract, is not executed in compliance with the requirements of the law, it may be annulled and rendered void. Hence, it is of the greatest importance to every inventor that his patent or contract be skillfully and accurately drafted, in order that it may afford him complete protection for his invention during the life of his patent.

### Secure a Good Patent.

An inventor should first ascertain whether or not his improvement has been patented to another. This requires an exhaustive search among all the patents in the class to which the invention relates. If, by this "preliminary examination," the improvement is found to have been previously patented, our client will receive, for the small sum of \$5 for the examination, a verbal or written report showing definitely wherein his invention has been anticipated, thereby saving him further expense and perhaps much time, anxiety, etc.

To avoid all needless delay, however, and secure patents at the earliest moment practicable, inventors will do well to forward a model, drawing or sketch, with a plain, full and comprehensive description of their invention (stating distinctly what the particular points of improvement are), with \$15 as a first installment of fees. If the improvement appears to us to be novel and patentable, the necessary papers for an application for a patent will be prepared immediately and forwarded to the inventor for his signature. When he receives the application and finds it duly prepared, he will carefully sign and return the same plainly addressed to us, with postal money order or express receipt for our own fee. The case will then be promptly filed by us in the Patent Office, and vigorously prosecuted to secure the best patent possible. [This course is the most expeditious and satisfactory, as no time is lost in transmitting correspondence relative to the preliminary steps.] When the patent is allowed the inventor will be duly notified, and on sending the final Government fee of \$20 to us, we will order the issue of the patent, and forward the same as soon as it is secured from the Patent Office.

The payments are thus divided and made easy. We make no pretense of doing cheap work, in order to entice custom, nor do we afterward make additional charges to bring the bill up to a fair compensation. We do our work honestly and thoroughly, and we never give up a case so long as there is a chance of obtaining a patent. The Agency charge, including drawings, rarely exceeds \$40, and for this we do all we can without appealing the case.

### Models and Drawings.

Models are now seldom required by the Commissioner of Patents, and generally only in intricate cases. Perfect drawings of practical working machines are more satisfactory to the Patent Office than the old cumbersome system of storing up an immense bulk of countless models.

Drawings or sketches, sufficient to illustrate the invention clearly, with a description that will enable us to make a full set of perfect drawings for the Patent Office, is all that we require. A model will answer our purpose as well, however, in cases where the inventor can more easily furnish it. The value and even the validity of a patent often depends on the character, clearness and sufficiency of its drawings. There are thousands of existing patents in which the improvements are but partially or poorly illustrated in the drawings. When an attempt is made to dispose of such patents, the vagueness and defects of the drawings often a prejudice capitalists and manufacturers against the invention, while in reality it may be of great value, and would meet with ready sale had it been skillfully, completely and artistically portrayed. In all cases prepared by us, the drawings are made under our personal supervision, by skilled draftsmen in our constant employ, and every precaution is taken to have the invention fully and clearly shown by different views, so that the improvement will be readily understood by the Examiners in the Patent Office, and comprehended by the public when the patent is granted.

### Advantages to Inventors on the Pacific Coast.

The firm of Dewey & Co. has edited and published the MINING AND SCIENTIFIC PRESS continuously since 1860, a period of 28 years. Few agents, who are still engaged in the business, have had so long-extended practice in patent soliciting. The members of the firm give personal attention to the applications entrusted to their care; and their familiarity with inventions and with local affairs in the Pacific States and Territories, enables them to understand the wants of inventors on this coast more readily and thoroughly, as we believe, than any other agents in America. Thus there is saved a great deal of the time which ordinarily—when distant agents are employed—is wasted in preliminary writing back and forth.

This happy combination of long business experience together, and wide connections, has placed our firm in a position unquestionably most fortunate for affording inventors prompt and reliable advice, and the best facilities for securing their full patent rights with safety and dispatch at uniformly reasonable rates.

Every patentee of a worthy invention is guaranteed the gratuitous publication of a clearly-stated and correct description of his invention, in one or more of our influential and reliable newspapers, affording thus the circulation best calculated to widely inform the class of readers especially interested in the subject of his invention.

### Caveats.

A caveat is a confidential communication made to the Patent Office, and is therefore filed within its secret archives. The privilege secured under a caveat is, that it entitles the caveator to receive notice, for a period of one year, of any application for a patent subsequently filed, which is adjudged to be novel and is likely to interfere with the invention described in the caveat, and the caveator is then required to complete his application for a patent within three months from the date of said notice. Caveat papers should be very carefully prepared. Our fee for the service varies from \$10 to \$20. The Government fee is \$10 additional.

To enable us to prepare caveat papers, we require only a sketch and description of the invention.

### Rejected Applications.

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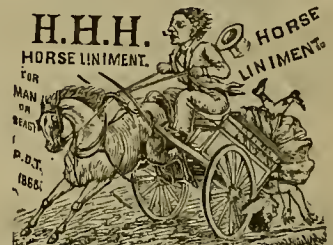
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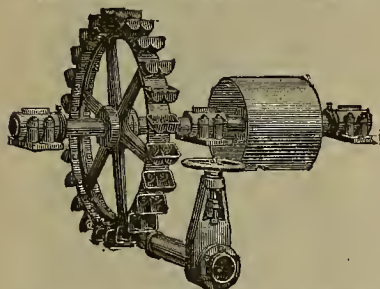
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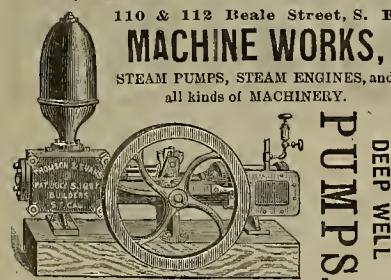
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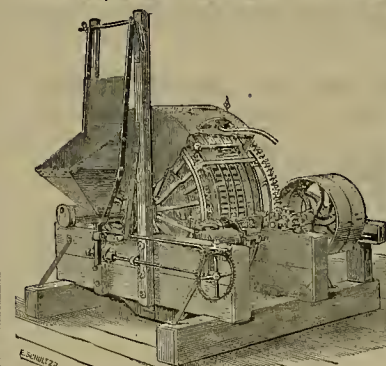
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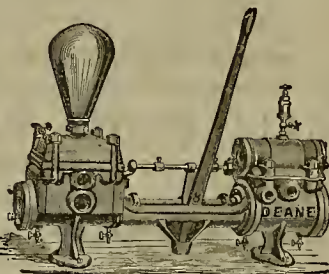
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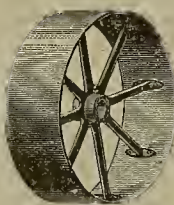
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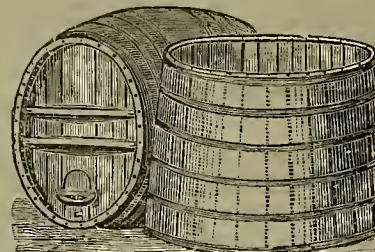
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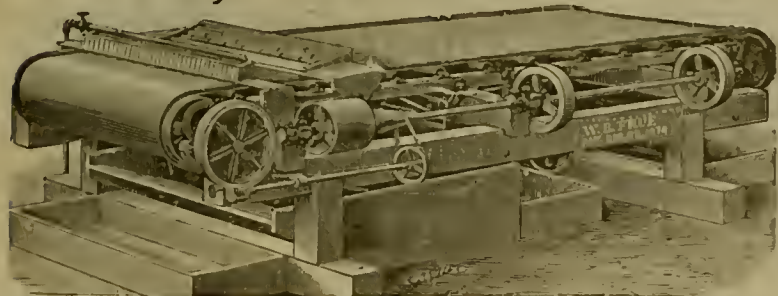
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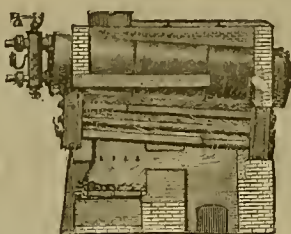
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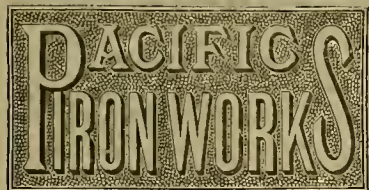
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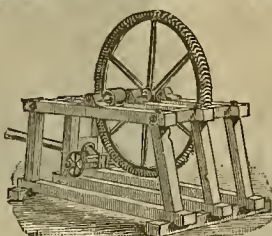
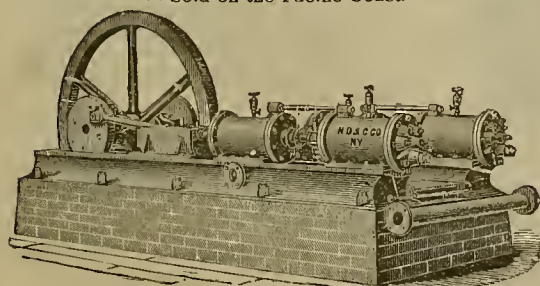
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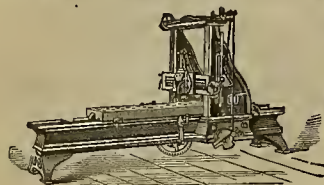
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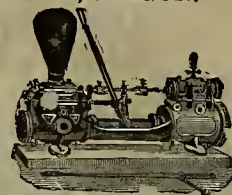


Putnam Planer.

# PARKE & LACY.

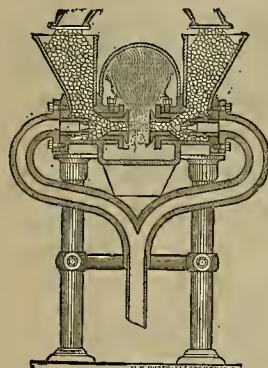
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Sectional View of Pulverizer.

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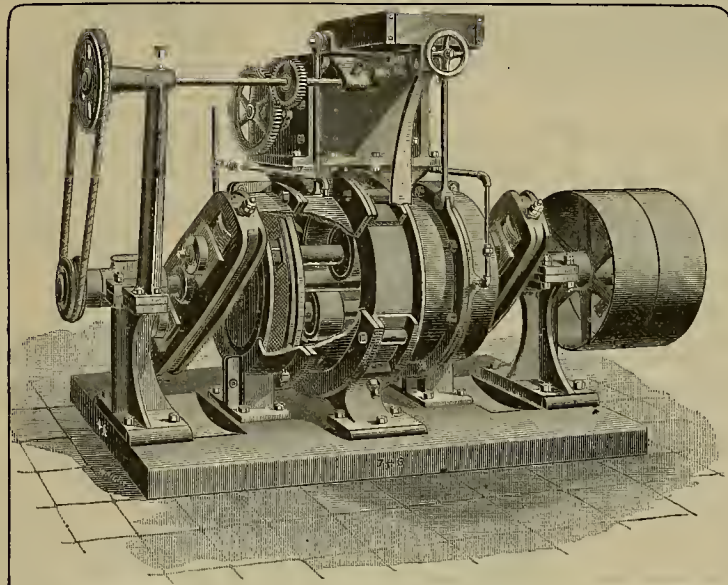
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IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

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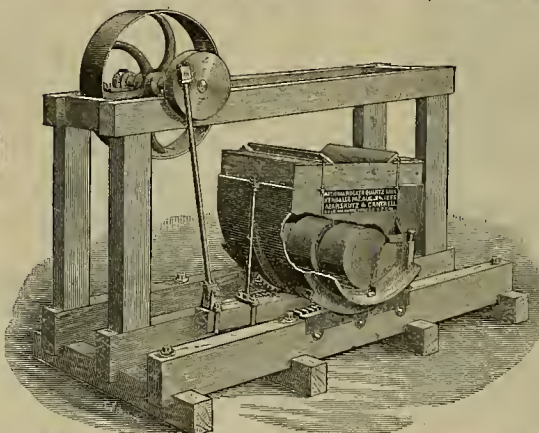
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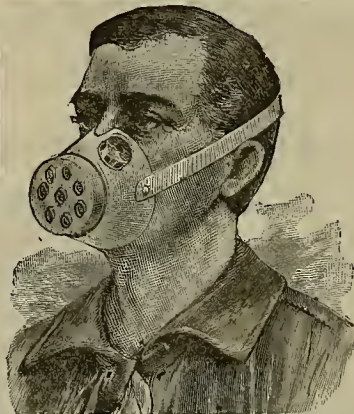
1. The cost is less than one-half of stamps of same capacity.
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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, FEBRUARY 25, 1888.

VOLUME LV.  
Number 8.

## Fire-Proof Buildings and Vessels.

Mr. Samuel Liddle, well known in connection with mining matters on this coast, has patented a system of constructing fire-proof buildings and ships. Fig. 1 of the accompanying engravings is a perspective view of the improved fire-proof structure, parts of the walls being removed. Fig. 2 is a detail sectional view of one of the shutter hinges for the shutters or doors. Fig. 3 is a sectional view of the two united plates. Fig. 4 is a longitudinal perspective view of a steam vessel having its boiler and fire-room inclosed in one of the improved fire-proof compartments.

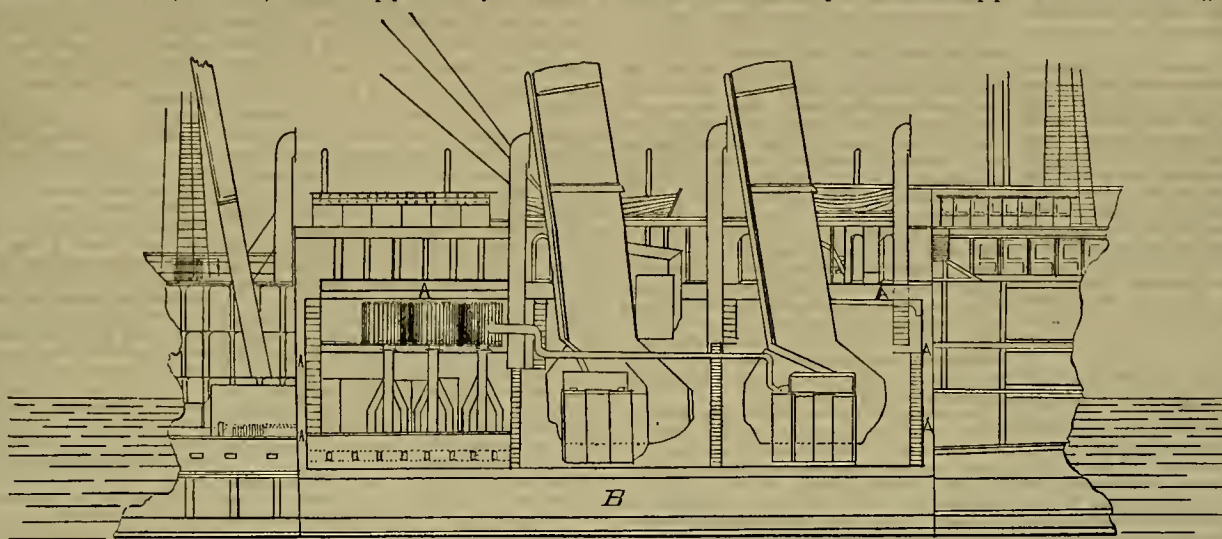
The structure is made of metal plates *A*, which are securely riveted or bolted to posts or beams *B*, provided with perforations or apertures *a*, so that the structure will consist of a hollow shell which can be filled with water, the beams, posts, etc., being perforated, so that the water can pass into all parts of the hollow shell. The water can be conducted into this hollow shell from any suitable reservoir, *C*, located higher than the building, and the pipes *c*, from this reservoir can enter the shell at the top or bottom, as may be desired. If desired, the pipes leading into the shell may be connected with a hydrant or with a water-main. The shell is perforated by a series of outlet-pipes, *M*, which are provided with suitable valves *N* as shown, which valves open

automatically as soon as the pressure of the steam created in the shell by the heat of the fire or the engine becomes too great. If desired, the outlet-pipe *M* may be conducted

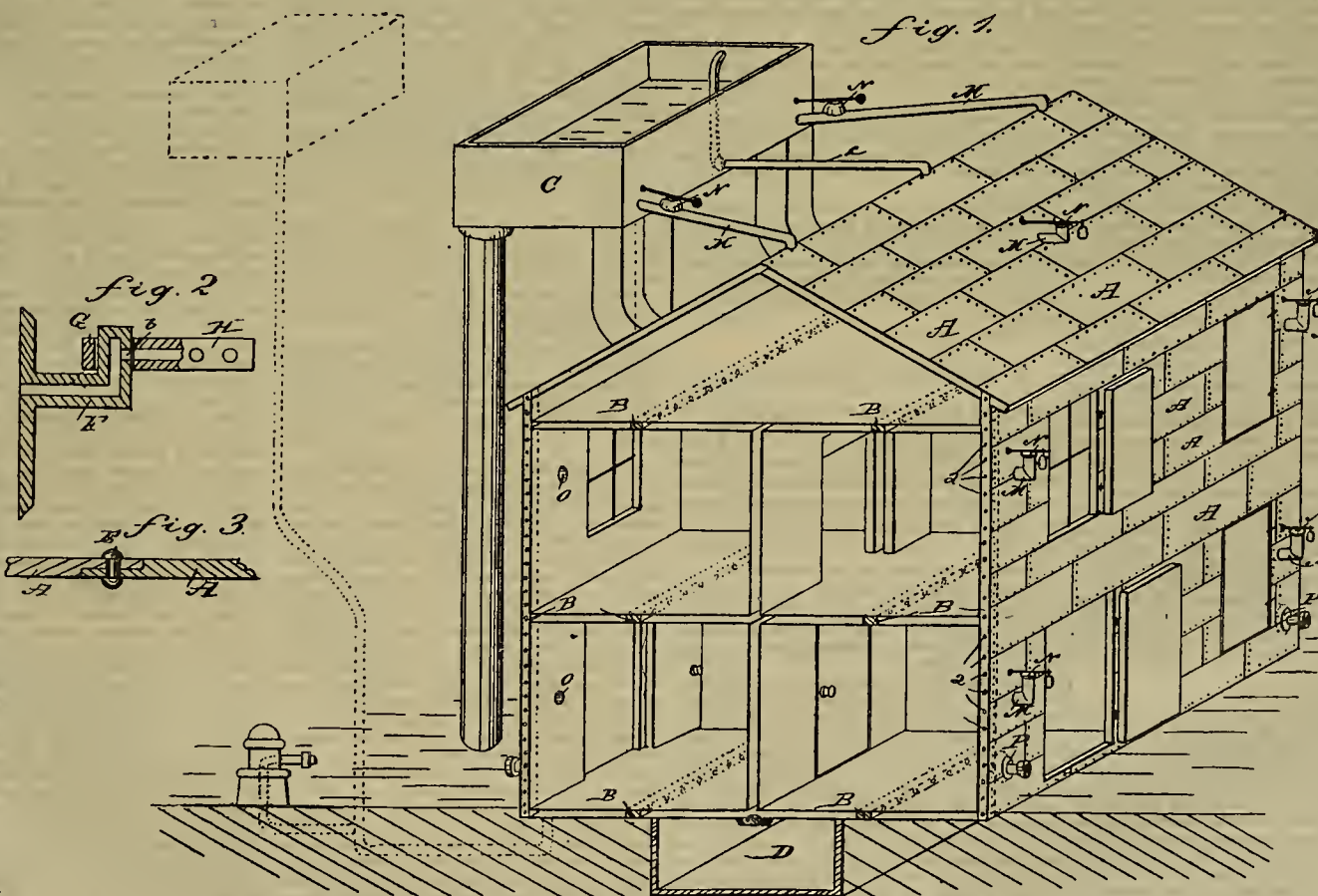
shell several times. The shell is also provided with openings *O*, closed by outwardly-opening valves, through which openings the smoke or fumes in the rooms can pass off. If the pipes

For the same purpose the inventor has provided nozzles, *P*, having check valves, to which nozzles hose from an engine or from a hydrant are attached for filling the shell with water,

and so that the water cannot flow out of the shell back into the hydrant or upon the ground when the pipes are removed; he has provided automatic check valves, for it is often so hot in the neighborhood of the fire that the firemen would not be able to go to the building to turn off globe or other valves, which would have to be used if the check valves were not provided. A tank, *D*, must be provided below the structure, or below the level of the lowest point of the shell, so that the water in the shell can be drawn off into this tank, and can later on be pumped from the same into the reservoir, *C*. The plates *A* overlap each other, and are secured to each other by means of rivets, *E*, Fig. 3, which preferably have their inner heads countersunk, so that the inner surface of the wall will be perfectly smooth and can be painted in imitation of wood, stone, or stucco. The shutters are made hollow, and are hung on hollow, angular hooks, *F*, Fig. 2, which are each provided with an aperture, *b*, through which the water can pass into the hollow eye *G* of the hollow hinge bar *H*, to which the shutter is attached. The lowest hollow hinge is intended to be located so as to drain the shutter. The doors can be con-



FIRE-PROOF CONSTRUCTION APPLIED TO STEAMSHIPS.



LIDDLE'S PATENT SYSTEM OF FIRE-PROOF CONSTRUCTION.

into the tank *C*, so that the steam in these pipes *M* will be condensed by the water in this tank, and can then flow again into the shell, so that the same water can be passed into the

from the reservoir *C* enters the building at the bottom, a check valve must be provided, so that the water that has passed into the shell will be retained and cannot flow out.

hollow eye *G* of the hollow hinge bar *H*, to which the shutter is attached. The lowest hollow hinge is intended to be located so as to drain the shutter. The doors can be con-



structed in the same manner, if desired; or wooden doors can be used for ordinary use. The hollow iron doors and shutters will thus be filled with water with the rest of the shell. If the shell is filled with water, the inventor is sure that the building will be absolutely fire-proof, and the plates cannot warp or shrink under the action of the heat. Around the window and door openings the outer and inner plates are connected with the window and door frames, which must have very close joints, so that no water can leak out. It is evident that the shell is only to be filled with water when there is danger from fire.

As shown in Fig. 4, the engine-room of a steamer may be constructed with hollow walls *A* in the manner described, and the doors and the hatches are also to be made hollow, and can be hung by means of the improved hinges, shown in Fig. 2. This hollow shell, filled with water, will prevent the spread of fire in the engine-room, and will be much better, simpler and cheaper for the walls or floors than the bricks or tiles such as are at present used in engine-rooms. The entire hull, the decks and the bulkheads of steam or sailing vessels may be constructed with two iron walls and the water space between them, if desired. In all cases these shells must be provided with gas or steam escapes, so that they will not explode or be ruptured or burst by the great pressure in the shells. If a steamer, it would be advisable to keep the space *B* under the boiler continually filled with water.

It will be seen by reference to the foregoing that the doors and shutters covered by this patent could be attached to any building already constructed, rendering the same proof against fire from adjoining buildings, water connection being made by any system of water supply. Compartments could be placed in any iron vessel with little, if any, alteration in the interior of the hull. Mr. Liddle, the inventor, having been engaged in mining in Nevada since the issuance of his patent, has made no attempt to introduce it, except experimentally, when it has fully met his anticipations. He is now ready to negotiate for the use of the patent. Address Samuel Liddle, care of P. O. Box 2361, San Francisco, Cal.

**UTAH COAL.**—The Salt Lake Tribune says: Some coal mines at the head of San Pete valley have changed hands and gone into an syndicate composed of Durst, Kimball & Co., six persons in all, who have six claims of 160 acres each, making a total of 960 acres. From one of the veins, 12 feet thick, over 3000 tons of coal have been extracted in the past three or four years. It has been opened up to a distance of 60 feet in, all well timbered. Another vein is six feet thick, on which the opening has gone in 40 feet. Then there is a four foot and a three foot vein on which but little work has been done. These mines are at an altitude of 6000 feet above the sea, are only a few miles from the town of Fairview, and the coal is classed as being of fine quality. The present owners propose making improvements and hope to influence the building of a railway so near to it as to make it easy to market and the basis of a great coal-mining enterprise. The Home Coal Company mines at Coalville produced 30,000 tons of coal during the year 1887. This coal was marketed chiefly in Park City and this city. The Utah Central coal mines at Pleasant Valley shipped 44,465 tons of coal during the year 1887. The Pleasant Valley Coal Company did a big business in 1887, having mined and shipped 86,341 tons during that year.

**AMERICAN TOOLS IN AUSTRALIA.**—In the *Australasian Ironmonger* we note long lists of American goods which are highly commended; among these are saws, spades, shovels, picks, weighing machines, Rand rock drills, "the most popular drill in New Zealand, and, perhaps, in the other colonies," rackerock axes, Worthington's steam pumps, mill machinery, American stoves, "always growing in popularity," tram cars, barbed wire, lager beer, and innumerable other articles. There are numerous references in our Australian exchanges to the great mining records, almost equaling our own, made with the Rand Slagger drills and rackerock; in fact, we have before us a list of no less than 31 different parties in New South Wales, Victoria, Tasmania and Queensland, that are using these deservedly popular American drills and explosives.—*Engineering and Mining Journal*.

**EUROPEANS LOOKING TO THE UNITED STATES FOR ARMAMENTS.**—The sure and near prospect of a general European war is inducing some of the minor powers to look elsewhere than to their sister nations of Europe for their munitions of war. Italy is already negotiating with American firms because her own works at Spezia are unable to turn out work as fast as needed. Spain will be the next. The Spanish Cortes, which recently adjourned, voted \$45,000,000 for new iron-clad. Notwithstanding a provision was placed in the bill requiring the work to be done by Spanish labor, no doubt more or less of it will be ordered by the contractors from this country. At any rate, it is quite sure that English workmen will not be benefited by the appropriation.

**FAST SAILING.**—An ice yacht will skim along at 70 miles an hour.

## CORRESPONDENCE.

We admit, unindorsed, opinions of correspondents.—Eds.

### From Soulsbyville, Cal.

**EDITORS PRESS:**—I send you a few mining notes from this place and vicinity. This county has had a black eye for several years, but of late there is a little boom in mining. Capitalists have taken hold of a few of the mines, and no doubt the majority of them will make first-class properties; but there are still mines lying idle that I know to be good if men with capital would take hold of them and expend a few thousand. The owners are not in circumstances to do it themselves, but are willing to hand and give ample time to prospect them thoroughly before paying for the mines. I hope to see them opened soon, as I am sorry to see such mines idle for the want of capital. There have been some good mines in the county, and there are still good ones. One great drawback is a certain class of men who have what they call mines to sell, and in order to get mining men to examine them will speak ill of other good mines.

As a general rule, their mines are nothing more than a hole in the ground. The sale of several mines in years past has been broken by this class of men. They are a great drawback to the county, and the sooner they are found out the better it will be for mining.

A San Francisco company has hooded the Platt and Gilson mines, the south extension of the famous Soulsby mine. They have put a force of men to work putting up buildings, and they will commence the erection of hoisting works as soon as machinery arrives. They are also digging a ditch to connect with the Soulsbyville branch ditch to get water for hoisting and pumping purposes. The pipe has just arrived and is being put in place. They will have a pressure of 200 or 300 feet. The above mines were worked in early days to the depth of about 100 feet, and thousands of dollars were taken out, the ore paying as high as \$90 per ton. The Soulsby has been one of the best mines in the county. And as the Platt and Gilson form the extension, there is no doubt but what they will be equally as good as the Soulsby when fully opened.

Last week two veins were struck in the Basin mines. The ore is said to be very rich. A company has the mines hooded, and have expended several thousands, but it looks favorable for a fine property. It was worked in early days by the Lewis Bros. to the depth of 100 feet. They took out several thousands, and had eight or nine veins all in paying ore.

A full force of men is now employed at the Black Oak mine. The mill was started on Monday of last week. They have a large vein and good milling ore, being about one mile from the Soulsby mine, which has been one of the best mines in the county.

Messrs. Lowe and Moore, who have the Woodpecker mine hooded, are sinking a shaft on the vein which is small, but some of the ore is very good.

The Dead Horse mine has a full force of men employed. They have sunk the shaft to the depth of 500 or 600 feet and have cut the vein at the different levels, which is of good size and all pay ore.

Rock is being taken out of the Fifth Ward claim that will go \$500 or \$600 to the ton, but the vein is very small, rock hard and consequently it takes considerable time to get out a few tons; but the parties working it are sinking on the vein and are in hopes the vein will enlarge in going down.

Soulsbyville, Cal.

### Tracing Ancient River Channels.

**EDITORS PRESS:**—Your correspondent, H. Clendenen, in the issue of the MINING AND SCIENTIFIC PRESS for Feb. 11th, seems very enthusiastic over the important discovery he has made, a discovery, as he says, which has hitherto "bested the skill and capital of the world to find out;" and I sincerely trust that the gentlemen will be induced to communicate his discovery through the MINING AND SCIENTIFIC PRESS to the world, which is badly in need of such important information to establish their faith in gold mining, especially gravel mining in Nevada county.

After spending several years in the scientific exploitation of ancient auriferous river channels, and knowing how valuable such mining claims are when they are found under favorable conditions, in the right situation, and when managed by those who know how to work them, I have no hesitation in saying that a real discovery of this kind is of importance. But it is a well-known fact to all mining men who have been called upon to expend money in searching for and working such placer claims, that all the mining population who have stood by their claims for the last 30 years in the counties where those ancient rivers exist, are each and all endowed with just this scientific faculty, and whose faith in holding on to their claims through all those years has been the result of just such a discovery as Mr. C. mentions.

And it almost looks like an insult to those old miners of the 40's and 50's in Plumas, Sierra, Nevada, and Placer counties, to tell them that the above discovery has just been made. How

many scores of such placer-mining claims do I know which the owners have stuck by for all those years, and spent the assessment work in keeping the lines hushed, and who have refused tempting offers from capitalists, and all because they are so highly gifted as to know just how many millions of dollars lies within their claim. Now to tell them that this knowledge is a new discovery is certainly very tantalizing to say the least. Of course it may be new to Mr. C., but it is not new to the miners of the Sierras; and any capitalist who would like to invest with certainty in such class of mines will have no difficulty if they are willing to pay a fair price, and apply to any respectable mining engineer acquainted with those districts.

If Mr. C. will kindly communicate his discovery to the PRESS, I will be very pleased to criticize the same, and add a little more of my experience on the subject.

ROBERT STEVENSON, C. E.

Lick House, S. F.

### Use of Oil on Rough Seas.

**EDITORS PRESS:**—"Philosophy of the Use of Oil on Rough Seas" was the title of an article published in the columns of the PRESS of Jan. 14th. Since writing that article Orin Dennis of Alameda Co. gave me the following account of an incident in his sea-faring life, as a proof of the magical effect of oil on a rough sea, which in that instance saved the vessel from shipwreck, and the crew from a watery grave.

In Oct., 1844, the schooner Six Brothers of Boothbay, Maine, Capt. Farmer, coming from the Bay of St. Lawrence, very heavily loaded with kench eated codfish, encountered a heavy gale when homeward bound coming up from Cape Canso to Cape Sable, thence across the Bay of Fundy to Boothbay.

After passing Cape Sable, running dead before the wind, under close reefed foresail, at the rate of ten knots an hour, with an increasingly heavy sea, the danger of running on to a lee shore became imminent if that rate of speed was kept up. Not daring to heave to in such a heavy sea, it became necessary to devise some means of slackening the speed. All sail was taken in, and, succumbing under bare poles, the sea was still so rough that every sea was breaking heavily over the schooner; some other means had to be resorted to, to save the vessel and lives of those on board.

There were two large casks, one on either side, fastened to the sides of the vessel abreast of the main rigging. These casks contained cod-liver oil.

A small gimble-thole was bored in each cask, so the oil would run out very slowly into the scuppers, and as the waves broke over the deck the oil was washed overboard, and soon the benefit of this oil was noticeable. The heavy swell continued, but the sea no longer combed; the oil gave the sea a smooth, glassy appearance and relieved the vessel from the heavy burden she was laboring under. They ran now at the rate of about five knots an hour, saving the vessel from running on a lee shore.

At sunrise the next morning the weather moderated, and at 2 o'clock P. M. of the same day they made Monagan island, 16 miles from Boothbay. They had light winds from there into port.

At ten A. M. the next day they ran in alongside the wharf where the anxious wives and mothers were gathered to meet their husbands and sons.

That application of oil saved the vessel from breaking up in that terrible sea and saved also the lives of the crew without doubt.

Five other schooners sailing from the same port left Cape Canso in company with the Six Brothers, and were crossing the Bay of Fundy at the same time. Nothing was ever heard of any of these other vessels or of any one of the crews.

M. A. S.

**THE COAL MARKET.**—Coal continues scarce and high in San Francisco, and the yards are no better off for supplies than they were some weeks ago. Every coal vessel that comes in is discharged without delay, and those that have coal available for retailers are besieged with long lines of carts and wagons awaiting their turn. An encouraging sign is the advance in wheat freights outward. This will tend to attract vessels to this port, and most of the wheat ships bring coal. Freight rates have been discouragingly low for months, and many ships have kept away from this port in consequence, and this largely accounts for the present scarcity of coal. A local circular says: "The outlook is for an almost ascertained continuance of high prices for several months to come, as no source for early relief is visible; most of the cargoes of foreign coal now en route have changed hands several times since shipment, and all near at hand are held at fancy figures. The scarcity of tonnage for coal in Australian waters has caused the engagement of a large number of vessels on this side to proceed to Newcastle to load and return with coal, and freight quotations have gradually advanced from 21s. 6d. to 25s. per ton, with further advance anticipated. If the coast collieries fulfill their promises of an output within the next three months, it may stay any further advance, but it is natural to suppose that present figures for their product has encouraged them to send to market all they could possibly extract."

### James Watt's Workshop.

A Visit to the Birthplace of the Steam Engine.

[Written for the PRESS by J. RICHARDS.]

The private or home life of James Watt is but little known beyond the neighborhood of "Heathfield." This name is that of the old homestead, three miles or so from Birmingham and nearly two miles from the old works at Soho, of which every one knows something.

Heathfield consists of 19 acres of heavily timbered woodland, in the midst of which is the plain old mansion of James Watt—not quite so plain now as formerly, because in the fitness of things, the place was leased about ten years ago to George Tangye, Esq., of the celebrated engineering firm of Tangye Bros., who has added various improvements and beautified the old mansion in various ways.

Shortly after Mr. Tangye took possession of Heathfield, the writer was invited to spend an evening there and examine in company with Mr. Tangye "Watt's room," which to that time Mr. Tangye himself had not fully explored.

In the lease is included a bond of a large sum binding the lessee to keep intact this room, sacred to the engineering world—a kind of mechanic's "Mecca," that is to last yet for generations to come, no doubt. Watt's room, as it is called, is a private workshop in which Watt, after retiring from active life at Soho, spent his time in experimenting and constructing machines.

It is in an angle over the kitchen room and attainable by a narrow and rather obscure stairway. It is about 20x16 feet, and contains a world of queer things, which it will be impossible to describe here.

Just before entering, the writer's attention was drawn to a small circular shelf alongside the door where it was the custom to leave Watt's luncheon at the middle of the day. He would not be disturbed at that hour and the custom was to eat his luncheon there, rap on the door, and come back in an hour to remove it intact or partly eaten, as his inclination and time permitted. In the evening he dined with the rest, and threw off his shop cares.

In the room is a very complete foot-lathe with a complement of all kinds of rotary implements that can be applied by a lathe. There are not less than 50 drawers in the room, all of them filled with various kinds of tools and supplies. The tools were very complete, and in most cases laid in wooden trays to fit, or else wrapped in oil paper.

On every side was order and method.

A large open stove of the "Franklin type" was employed for warming the room, and in it are the embers left undisturbed since 1819, when Watt died. On the top is a circular hole to receive a crucible in which there is now some remnants of an assay of some kind he had been making just before his death.

At this time he received from some of the mines in Cornwall the royalties on his engines in ore or unrefined metal, and it is supposed he was testing and valuing some of this at the time the last fire was lighted.

The strangest thing in the room is, however, his copying or pantograph machine, as perfect a one as has ever been made at least in all essential functions. It is mounted on a frame of beech wood, about five feet square and four feet high. On it is a bust of a human head one-half completed, and a perfect prototype of the original which is alongside.

As Watt died in 1819, the query arises how could Blanchard or others afterward secure patents on a copying lathe for shoe lasts, gunstock and so on when there long before was a completed machine of the same kind, a refined one and capable of executing the most delicate copying.

The writer, at the suggestion of Mr. Tangye, climbed up to explore a high shelf containing things not visible from the floor. Mr. Tangye waiting to receive what was handed down. Imagine the sensation of rummaging over these things, undisturbed since they were placed there by the father of the steam engine, near 70 years before! Everything was covered with a heavy layer of dust, some places half an inch deep. Among other things was an earthen jar of mercury that was at first thought to be "glued down," because of its weight. A half-inch of dust removed showed the mirror surface; a large meerschaum pipe, well colored and bearing unmistakable evidence of faithful use; next a roll of papers, neatly covered and tied. These proved to be shipping lists for engines identical with some that had been recently shown as a new invention. The lists contain the names of all the details of a steam engine in a column, and opposite a line for numbers. In shipping, the things sent are marked with the number of pieces, and what is not sent is crossed out.

It is impossible to attempt even a partial description of what the room contained, or what it does contain, for there it must remain until the dust of ages has obliterated it, unless destroyed by fire. As before said, the lessee is bound to maintain all as it exists, making only such changes as will prevent destruction. It was at the time discovered that one of the poets of the copying-machine frame was dangerously worm-eaten. Mr. Tangye proposed to renew this, and permitted the writer to saw off a length which is now at the Mechanics' Institute, in this city. A bust of Watt in the main



hall, as one item, appears in the band noder a forfeitures of 100 guineas for injury or defacement. Among the forest trees is, no doubt, a California gray squirrel, carried from San Francisco in a cage by the writer's wife, and presented to Mr. Tangys. These beautiful animals have no prototype in Britain, and were much prized, but ignorant, of course, of his classical surroundings at Heathfield.

Watt is gone with Bolton, Murdock and the rest, but the old works are there yet, "James Watt & Co., Engineers, Soho." Of this, however, I can do no better than to offer a reprint of a letter which I wrote for the Philadelphia Press not long since.

James Watt & Co., Soho.

Three miles or so from "Brommagen," Borough-Mitcham or Birmingham, all names for the same town, in a northwesterly course, "out Smithwick way," is "Soho," the birth-place of the steam engine, the place of Watt's latest labors, the place of his triumph and that of Bolton's, not less to be held in remembrance. Starting from Birmingham on foot, after some scores of tortuous windings and turnings through lanes, streets and even through turnstiles, one comes to "Soho," or the edge of it rather, and there, on the bank of the canal, can be seen, by going through a narrow street, painted in large white letters on a gate, "James Watt & Co."

There is no humbug in the case, if we except the fact that James Watt died in 1819. There is the old shop, most of it—or part of it, at least—just as he left it; not a small shop, but a vast collection of shops, sheds and so on, making up what is in England called an engineering works. And well worthy the name, too, for one can there see in process of construction huge marine and other engines modern in type. Not a defunct shop by any means. It is only three years or so ago when James Watt & Co. constructed the famous pumping engines for the sewage works at Pimlico, London, a piece of engineering work worthy of Penn or Mandeslay.

The tools are a marvel and a wonder. Side by side we may see drilling and other machines, one of Watt's time and the other of the latest Manchester type; mostly, however, old tools—vast, roomy and efficient—driven in some cases by large wooden drums, six to eight feet in diameter, carried on square shafts revolving at 20 to 30 revolutions a minute.

Here is the romance of the steam engine, and one who has read of the trials, disappointments and labors of Watt and his courageous partner, Bolton, feels like removing his hat and standing in reverence before these, the first agencies in producing man's strongest ally, the steam engine. Sometimes we hear it said that Watt invented the condenser, governor and some other details, but this is not correct. He invented the steam engine.

The term "inventing" is a broad one. It covers more than the conception of a new thing or even making it. In Watt's case it means a hundred fold more if we include his disheartening labor of forcing people to accept the invention. He labored night and day for years, impetuous and threatened with a debtor's prison, against the pangs of disease and the derision of every one—even labored against the laws of his country, which nearly snatched away his invention at one time. But to return to the old shop.

There are five or more steam engines in the works, all of them old and quaint. Two of the most ancient ones are in charge of an old man, who, with his gray hair, seems to be an integral part of the machinery. The largest, a huge beam engine, which was silently working away, he said "had not required a new brass for 20 years, and now, after 70 years of service, was as good as ever." The other one, a kind of hell-crank engine, near by, was inquired about. "Don't you see, sir," said the old attendant, "how smooth she works; not a brass has been put in or a new part supplied for more than 40 years," and he was right no doubt.

Half a mile away in Soho proper is Heathfield hall, Watt's old home, where he rested and died. Not rested wholly, because there is a room kept sacred and as he left it—his workshop. What a privilege to see that! I had visited various famous places in the Old World and the New, but never entered a door with the same feelings of reverence that I did on that occasion, when, with candles, which shed a gloomy light around, we stepped into Watt's private workshop.

**NEW COAL FIELDS.**—Dunsmuir & Co. will commence immediately the opening up of a large extent of coal lands in Como, B. C. They include a district some 10 miles in length, and will necessitate the construction of about 13 miles of railway and a large extent of wharfage. Railway surveys will be completed in two weeks' time, and 700 men will then begin building the railway and wharves and developing the mines. The owners anticipate being in position to ship coal from the new mines early in the fall. Mr. Dunsmuir expects the daily output, when the mines are thoroughly opened up, to reach 2000 tons.

**STOCKTON, Utah,** gives signs of more activity in mining this season than in the past. There is a feeling among owners of property that the camp is bound to come to the front with large production and good development of the ledges, and this has inspired such confidence that most of the claims will be prospected during the summer.

## Health Homes on the Desert.

While there is little doubt but the invalid class is on the increase in the United States, and perhaps also in most other civilized countries, it is notoriously the case that the victims of consumption are being everywhere multiplied at a very rapid rate. Of the deaths that occur in the Atlantic States 20 per cent or more are caused by affections of the respiratory organs, pulmonary or bronchial, both being in most cases involved. There was a time when the notion obtained among the practitioners of the healing art that this disease could be cured, or at least palliated, by drug medication—an idea that has become to be so thoroughly exploded that it can hardly be said to hold any longer a place in the therapeutics of even the most conservative school of medicine. It is now admitted by the profession everywhere that about all that can be done for this class of ailments is to place the sufferer under the most favorable conditions and leave nature and natural remedies to work a cure or stay the ravages of the malady as far as may be. To this end, the first thing to be done is to supply the sufferer with fresh air and plenty of it. The next thing to be done is to keep him as much as possible in the sunshine. Then come in good water, suitable diet, judicious exercise, bathing, and such other auxiliaries as in every disease tend to a restoration of health, the air and the sun being the agencies most to be relied upon for cure or relief in cases of consumption, though there are numerous other bodily ailments in which these will be found almost equally effective.

If then the theory above advanced be correct it becomes pertinent to inquire after the country or locality that to the largest extent meets these requirements—where shall we find the purest air conjoined with the least interrupted sunshine. In our opinion this condition of things will be found in the barren region that occupies the southeastern angle of California—anywhere on the Mohave or the Colorado deserts. There is not in this region, covering an area of 20,000 square miles, an acre of malarial land, there being here more than 300 absolutely clear days in the year. As the annual rainfall hardly ever exceeds six or eight inches, the surface of the earth is nearly all the time warm and dry, and everywhere as clean as a well-kept park. While the summer months are extremely hot, the temperature during the rest of the year is moderate, and the climate in all respects delightful. No snow falls here except on the mountains, nor is ice to the thickness of an inch ever seen. The doors and the windows may be kept perpetually open, nor are there a dozen of nights in the year but what a man under a pair of thick blankets can sleep in the open air without peril to health or the least discomfort. Even the most delicate invalid could, if so disposed, keep out of doors nearly the whole time; and thus would the consumptive patient be able to avail himself of the heat possible means of recovery. While this region would offer to every person of impaired health an incomparable winter resort, it would be to those afflicted with cutaneous and pulmonary complaints especially well adapted.

From what has been said the reader will infer that this great southeastern Sahara is not a very attractive country as regards soil, scenery or natural productions, as indeed it is not. It is what its name implies, an arid, sterile waste, so barren of even the lowest forms of life—sustaining foods that the Digger Indian, least dainty of mortals, has never been able to subsist there. It is, in fact, an almost rainless, treeless, waterless region, yet withal so clean and pure, so free from mists and clouds and insect pests, so sequestered and quiet, that it ought to form a welcome retreat for those in search of health, rest and peace.

A race is coming on—a race has already arrived—who are so far gone and effete that they require not so much exercise or recreation as absolute rest—rest, not only from work and the worry of business, but rest from the excitements and the excesses of a too active or a too luxurious life. If we could confine them in a vacuum or temporarily suspend animation, it would be the proper treatment for them. It is just because there is nothing or so little on these deserts that they would constitute the most suitable asylum for a class of patients whose vitality is so nearly extinct.

Exercise if needed could, of course, be taken here. There are mountains that might be climbed, while the pedestrian so disposed might start out and walk a hundred miles in almost any direction without impediment. The most of the country being level and the surface hard, riding on the bicycle could be practiced to good advantage, the opportunities for locomotion by other methods being equally good. Being traversed by several railroads, this region is easily accessible from every quarter. That there will in due time be established here a sanitarium for that class of valetudinarians who require most to bathe in the sunlight and to plentifully breathe the pure air, and for those who need mere abatement more than anything else, we verily believe.

It should be stated that water can be obtained in most places on these deserts at considerable depths. It is apt to be soft and pure, and, while the flow is not always heavy, it would, in most instances, suffice for the uses of a large establishment, baths included, provided the number of bathers was not inordinately large or their ablutions unreasonably frequent. The

practice of hydropathy might not always be feasible. The disciples of that school might, in some cases, have to forego this pleasure of the plunges bath and the douche, though the dripping sheet and the wet compress would be luxuries in which they might occasionally revel. In the sun bath all could indulge without let or limit, and in the atmospheric sea, charged with the life-giving ozone, lave themselves to their heart's content.

## Idaho Districts.

The Boise (Idaho) Statesman makes the following extracts from the Board of Trade Report: With regard to mining, from the best information we can obtain, we find the output of this year 1887 is about \$9,500,000 in the Territory. Of this amount we find that Ada county has furnished \$200,000, Alturas \$3,300,000, Boise \$659,000 and Owyhee \$150,000.

The different mining districts in Southern Idaho, more or less tributary to Boise City, are generally improving.

At Rocky Bar the Alturas limited has produced during the past year about \$340,000. The Wide West mine, which has been lying idle for years, has recently been purchased by an English company which expects at once to proceed to work to sink a shaft of 500 feet in depth. The indications are that within two years there will at least be 250 stamps dropping in the vicinity of Rocky Bar, and the output from this section of Alturas county will soon equal if not surpass the Wood River country. Some communication directly with Rocky Bar, either by wagon-road or railroad, would greatly increase the business of Boise.

At Atlanta but little work has been done. Mr. Miller, superintendent of the Tahoma mine, proposes this coming summer to erect a 20-stamp mill to concentrate his own as well as on others.

The new district of Pine Grove last year turned out considerable haulion. A St. Louis company has invested in the district and proposes to erect a 30-stamp mill.

At Wagon town, Mr. De Lamar has opened up the Wilson mine and the showing is fine. He is forming a company to erect a large mill on this property.

The Henrietta mine is also doing well. It is operated by the Proustite Company of New York.

On War Eagle mountain the Owyhee and the Empire are being worked.

On Florida mountain some new developments have been made. Messrs. Phillips and Sullivan are working successfully.

In Boise county a number of mining enterprises are successfully carried on.

The Gold Hill mine, one of the most successful mines in the Territory, still continues to produce, also the Forest King. A new mill will be erected on the Gambrine this year by its owner, Mr. Cunningham.

The Elmira at Banner continues to run its 25-stamp mill. Its annual output is about \$150,000.

The placer mines of Boise county produced last year about \$500,000. These placer mines will continue producers for many years to come.

At Sheep mountain many of the mines are looking well and bid fair to develop into fine paying properties.

Deadwood is looking well. A New York company has purchased large placer claims and are building a large ditch to operate them.

In the Wood river country many new and valuable strikes are reported, and while many mines have shut down for the winter an unusual active year is anticipated.

**MINERAL PRODUCTS IN THE BUTTES.**—A dispatch from Marysville says: Reports from prospectors in the Buttes back of Sutter City are more favorable. On the Moody place the coal vein is said to be widening as the development goes on. Like reports come from the Newcomb place. The coal is pronounced bituminous and undoubtedly of good quality. In prospecting for coal a large deposit of potter's clay has been discovered, and is said to be of finer quality than that used at the pottery works in Lincoln, Placer county. First-rate specimens of gypsum, in the form of selenite, was found in the Buttes many years ago, and attention is being again called to this mineral. The extent of the deposit is not now known. Four men left Marysville to-day to continue prospecting for natural gas and oil on Eli Davis' ranch in the Buttes. They have found oil floating on water that issues from a tunnel. The Sutter City people are much excited over the mineral prospects in the Buttes. The town is going ahead very rapidly. New buildings are going up, stores being opened, and work has commenced on the school building, which is to cost \$10,000. The contract calls for its completion in 90 days.

At Silver Reef, Utah, the Stormont mill is running steadily and crushing an average of 20 tons of silver sandstone ore per day. This is chiefly custom work, for which the mill gets from \$5 to \$7 per ton, the average being about \$6. The ore runs from 10 to 20 ounces silver per ton, with some as high as 25 and 30. The Christy mill is crushing ore at the rate of 40 tons per day. That company works ores only from their own mines, chiefly the California and Stormy King. In the former the ore shows finely now in the lower level.

## Copper in 1887.

James Lewis & Son's (Liverpool) review of the copper market for 1887 shows that the year opened with Chili bars £38, 10s., and early in January half of the Anaconda furnaces were shut down. At the beginning of March they commenced full operations again; also the Copper Queen of Arizona. Chili bars that month rose to £39, 6s., 3d. In April the price ranged up to £40; in May there was a slight drop; in June it ran up to £40, 6s., 3d.; in July the highest was £40, 5s.; and in August £40, 7s., 6d. In September the market was flat, closing at £39, 15s.; in October it rose to £40 during the first three weeks and then the boom commenced, and the effect of a meeting in New York between the representatives of the chief American producers and of the Rio Tinto, where a limitation of production was proposed, was several large purchases of Chili bars, and an advance to £44, 5s. Though the combination was not made, the French syndicate purchased largely through November, and the price was driven up to £68, rising to £85 at the close of the year. The Calomst and Hecla fire aided the operations of the syndicates largely. The total import of copper into England and France is 7672 tons less than in 1886. This is due to a decrease in the supplies from Chili of 6429 tons, from Australia of 4049 tons, from Japan of 3372 tons, from Quebrada of 794 tons, and Newfoundland of 532 tons; while there has been an increase from the United States of 2794 tons, from Spain and Portugal of 3496 tons, from the Cape of 1193 tons, and from other countries of 16 tons.

Of Montana the circular says: From Montana we expect an increased production this year of at least 20,000 tons over the 9000 tons increase of 1887, advantage having already been taken by some of the companies to sell part of their production up to the end of 1888, at prices that will leave a very good profit. The recently constituted Boston-Montana Company is at present producing about 1000 tons of 60 per cent matte per month, and is expected before the year is finished to be turning out almost as much copper as the famous Anaconda, the Mountain View mine being very valuable and having large quantities of good ore in sight, the richer portion of which is now being shipped without smelting. The Anaconda Co. has recently put about 1200 tons of ore daily through their concentrators, producing about 3500 tons of 60 per cent matte per month in the furnaces; the ore from the Anaconda and St. Lawrence mines is, however, becoming poorer in copper as greater depth is reached. New works are in course of erection, but at present delayed by the winter, intended for the treatment of the ore from the Chambers' group of mines, recently acquired by the company, which contains about 7 to 8 per cent of copper, and from them not less than 1000 tons per month of 50 to 55 per cent matte is expected to be produced.

A survey of the whole American field is concluded as follows: We, therefore, estimate that the total United States' production should copper remain at or over £60 per ton, will not be less than 105,000 tons of fine copper for 1888. As the production of the United States for 1887 was about 9000 tons over that of 1886, the exports 3000 tons greater, and the estimated stock on the 31st of December, 12,053 tons against 6696 twelve months previously, it would appear that the consumption has increased very slightly. Against this we may look for an increased consumption, both in Europe and the United States. In this country large orders have lately been given out for the building of steamships, the use of copper wire for electrical purposes is extending, trade is reviving, and there is increased activity in the manufacture of machinery and of sugar-producing plant. It remains to be seen to what extent the present high cost of copper will diminish the ordinary consumption.

**THE STANFORD UNIVERSITY.**—The stonework of three of the picturesque one-story buildings of the Leland Stanford, Jr., University is now all completed. The ground plan of the buildings is in the form of an E, facing north, and the completed buildings are known as Nos. 4, 5 and 6 on the east side of the group. Work on three more buildings is in progress. The material is yellow sandstone, from the quarries near San Jose. The roofs of the buildings will be of red tile and similarly roofed. Connecting all the buildings will be a long corridor supported by stone columns with arches, like the courtyard corridor of some of the old missions. The architects designate the style as mission architecture, being an adaptation of old Moorish or Spanish architecture, many features of which were made use of in the construction of the mission churches of California.

**A GREAT CHINESE OVERFLOW.**—The details of the late Chinese flood, as they have come in, form one of the most terrible stories of suffering of which we have any record. What was a short time ago a beautiful, populous district of 10,000 square miles is now a rolling sea. At least 3,000,000 people are homeless and absolutely destitute of the bare necessities of life, while it is thought that over one million of people have lost their lives. The Government and the people are doing all they can to assist the two million survivors who have lost their homes, fields and everything upon which they depended for a living.





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SAN FRANCISCO

Saturday Morning, Feb. 25, 1888.

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## Passing Events.

We have been treated to quite a spell of warm weather during the week, with a dry north wind. The north wind will do little harm at this time.

The reduction works at Portland, Oregon, have again started up after a period of idleness. The success anticipated has not been met, and efforts are being made to get better rates on ore.

The question is up again in Congress, and has been favorably reported, to have a Government investigation of the debris question. It is opposed by the anti-debris people as a matter of course, but if some means could be devised to again permit hydraulic mining without injury to others, it would be a good thing for the State.

The copper syndicate seem to have been successful in cornering the copper of the world, as well as the output to come for several years. All the copper purchased is being sent to Europe.

There is quite an excitement near Carson over the recent finds in that vicinity.

Washington's birthday was duly celebrated as a holiday in this city, and the militia and U. S. troops were reviewed at the Presidio by the Governor and staff. Thousands of people witnessed the review.

## Character and Value of Mining Reports.

While the most of the reports made by our mining experts on properties they are called upon to examine are, no doubt, useful and reliable, it is matter for regret that there should be so many exceptions to this rule. Unquestionably these reports have of late years been entitled to more confidence than were those gotten up during the earlier history of mining on this coast, when investors were less exacting than now, and when the calling was crowded with upstarts and incompetents. Nevertheless there is reason to fear that much of this work is still done in a hasty and haphazard manner, the expert accepting too often the statements of others instead of ascertaining the facts by actual tests and personal examination. In this way the man of books and science exposes himself to be misled, and even runs the risk of being sometimes badly imposed upon. In the performance of his task the mine inspector must necessarily depend on those conversant with the history and condition of the property for much of his information. Still, he ought himself to be possessed of such knowledge and experience that he will not go far wrong on any vital matter.

Generally speaking, too little time is taken in the performance of this kind of work. The expert is in too much of a hurry. He runs through the mine, taking out here and there a little ore for assay. He asks a few questions of the superintendent or any one else he may happen to fall in with and his task is done, a day or two generally sufficing for its performance. He has seen but little, and much of that through the eyes of others. What can a man learn about a mine from such a cursory inspection as that? Not enough surely to make his knowledge a safe basis for the investment of large sums of money or for other important business transaction.

The vocation of the mine-viewer may he said to divide itself into three distinct classes, for, although not all of these may be recognized as legitimate members of the profession, there is always these three classes in the field; first, we have the self-constituted, self-proclaimed expert, who, without education, experience, or other qualification, sets up in the business, having for patrons those who want always a flaming report at a small price; a school of experts happily not so numerous now as of old; may their number continue to diminish. Then comes the really competent, intelligent, painstaking man who does his work thoroughly and eschewing speculations and theories, makes a report, short, practical and to the point. He is apt to be safe, sensible and trustworthy.

Finally, we have the scholastic expert, the man of profound knowledge and many acquirements, who begins at the beginning and goes to the bottom of things. His report is learned and voluminous, covering not only matters pertinent to the business in hand, but all kindred topics as well. Going back to the dawn of creation, he travels down the eons pointing out the physical changes that have since taken place. He discourses on the Paleozoic, the Mesozoic and the Cenozoic; dwells on the various epochs of animal life, describing the habits and appearance of the silurian reptiles, the ichthyosaurus, the pleiosaurus and the pterodactyls. He explains the agencies by which the fissures are formed and filled; whence come the ores and how they are deposited; in which connection the aqueous, the igneous and the magnetic theories are fully discussed. Coming down to the age of the Lower Cretaceous and the Old Red sandstone, he tells about them. Next he attacks the Frisssio and the Jurassic, and proceeding, talks about the Eocene, the Miocene and the Pliocene; about andesite, porphyrite, diorite and sienite; longitudinal, transverse, syndinal and anticlinal axes, and innumerable other ones, ites and axes, slinging solid chunks of geology around with an appalling looseness.

Now, while such display of book-learning is well enough in its proper place, it had better be omitted from a mining report, which should be thoroughly utilitarian and brief as possible, containing only information of an exact and practical kind. Any irrelevant matter, by distracting the attention, diminishes its value.

The trials and the temptations of the expert are many. He is in numerous instances employed to examine a property in which his em-

ployer has unbounded faith. He believes it to be a good one, and even possessed of great value. The expert discovers that this is an error, but being a compassionate person, he dislikes to rudely crush out the hopes of the owner; so, compounding with his conscience, he suppresses a little here and exaggerates a little there, producing a report much more favorable than the facts will warrant. Only on this hypothesis can we account for the highly colored statements so often found in these mining reports.

Going back through the files of the MINING AND SCIENTIFIC PRESS, there will be seen in almost every issue one or more announcements of some mineral find to the overshadowing importance of which the expert has duly certified. Now it is a bonanza of gold and silver; then a bed of anthracite coal equal to the best Cumberland, or may be a canal coal, so inflammable that it burns if you but touch a match to it. If these reports might be credited there occurs in nature not a metal or minerals but we have the same on this coast of every variety and in endless profusion. These being authority, we have here deposits of kaolin superior to the finest Chinese clay; antimony glsore; monntains of cobalt, nickel and tin; better marble and more of it than the Italian quarries can boast; cement, compared with which the Portland article is hardly better than ashes; not so many diamonds as in South Africa, but this only because we have not yet found them! As for iron, graphite, chromium, and a dozen other of the useful metals and minerals, we have such store of these as no other country on earth can claim!

Some years ago a Cornish expert, after having examined the San Jacinto tin mines in San Bernardino county, declared that he saw there more of that metal than could be found in all Cornwall. Of course the tin may be there, but there is no lack of courtesy in saying the men did not see it, nor has any one else ever seen it in any such quantity as by him represented. And yet this was not a willful misstatement. The Cornishman blundered—mistook a great deal of stuff that he saw for cassiterite that was not such. Then, very likely, he cheated himself, as many experts do, in selecting his samples of ore for assay.

The mistake of this man, though a signal one, was hardly greater than has been made by every mining expert on this coast, even those enjoying the highest reputation; and there is this more to be said: The mistakes committed by our own experts involved in most cases heavy losses, whereas the Englishman's blunder proved very likely a harmless one. The lesson taught by these errors, however caused or by whomsoever committed, is a simple and obvious one. They admonish to greater caution in the discharge of the very difficult and responsible duties here remarked upon.

CALIFORNIA HISTORICAL SOCIETY.—At the annual meeting of this society the following officers were elected: President, John T. Doyle; vice-presidents, John R. Jarboe, William Norris, Rev. A. Varsie, S. J.; treasurer, Joseph A. Donohoe; secretary, Wm. Carey Jones; directors, Horace Davis, R. C. Harrison, Bernard Moses, E. R. Taylor and J. V. Coffey. The treasurer reported a balance on hand of \$601.15. The following new members were elected: George S. Patton, Los Angeles; John T. Gaffey, Los Angeles; Dr. Paolo de Vecchi, San Francisco; Professor John B. Clarke, Berkeley, and Dr. W. H. Melville, San Francisco.

PORTLAND REDUCTION WORKS.—The reduction works at Portland, Oregon, have started up again on ore from the Sierra Nevada mine, mixed with dry ore from Salt Lake. These works have not been a success so far. The former superintendent left, and the fault was laid to him, whether with truth or not we do not know. It is stated now, however, that if the railroad company will do "the square thing" as to rates, the smelter can be run all right.

THE DEBRIS INVESTIGATION.—The House Committee on Mines and Mining has agreed to report favorably Congressman Biggs' bill, providing for the investigation of the mining debris question in the State of California.

The railroad company is gradually discontinuing the use of coal on the Sacramento division, and is coming back to the use of wood as the best fuel.

## The Proposed Debris Investigation.

The bill introduced by Congressman Biggs of this State provides for a Government commission to investigate hydraulic mining and its effects on the streams. The Supervisors of Yuba and Sutter county, and numerous others, have signed a memorial to Congress opposing the proposed investigation and giving their reasons for the opposition. One of the reasons offered is as follows: "Hydraulic mining being a private industry prosecuted for private gain, in which the Government has no interest whatever, an appropriation of funds for the purpose proposed in the bill is inconsistent with governmental policy."

It may be stated that there are two reasons why this statement is incorrect. The Government is interested in the condition of the navigable streams and the hay, which hydraulic mining is supposed to affect. But, in justice to the miners, the fact must be recognized that they thought their mining land from the Government for the purpose of mining it by the hydraulic system, and that this was well understood when the land was purchased.

Leaving aside the question of the Government wanting the gold from the mines, to coin into money, and other questions concerning this issue between farmers and miners, so much discussed, there is no reason why the Government should not investigate the matter, and see whether or not it has not practically deprived miners of their property without due compensation. Moreover, possibly, a competent commission might be enabled to arrive at some conclusion whereby the mines could be worked without injury to farming lands or navigable rivers. It is an engineering problem entirely. Most of the engineers who have gone into the subject have been partisans, working for one side or the other. An impartial and unbiased commission might be able to settle the vexed question. At least there seems no good and valid reason why it should not try, especially as it will involve no expense to either of the contending parties.

## The Alien Act.

In lieu of the various propositions which have been introduced during this session to modify the alien land law, Senator Stewart from the Committee on Mines and Mining has reported a bill to amend the law by providing that it shall not in any manner affect title to mineral lands or mining claims in the Territories which may be acquired or held under the mineral land laws of the United States; nor to mills or other reduction works or property used in the production of metals from mineral lands in the Territories.

This would, of course, cover the ground the miners require. What they want is to be able to sell their mines, if they can, to English or French capitalists or other foreigners. There are not many Americans of large capital who go into mining in our Territories. They prefer to go into "trusts" and other combinations or deal in railroad stocks, bonds, water stocks, etc. They do not seem to care much for legitimate mining enterprises. Few of our very rich men go into mining on a large scale, and when they do are apt to look more to the profits of dealing in stock than the product of the mine itself.

The English corporations believe more in getting the money out of the mines than the stocks. They therefore employ more men, build more extensive works and conduct their operations on a more legitimate basis than our own companies. They are satisfied, too, with smaller returns. The continuance of the present law will retard progress of the mining industry in the Territories very decidedly. They need all the capital they can get to develop the existing mineral regions. It is unfair to have such a law as at present prevails, when it was never asked for or desired by the mining communities which it affects. The results have been properly explained, and it is to be hoped that Congress will pass Senator Stewart's bill or any other that will give the relief desired.

A COMPANY has been organized at Las Cruces, N. M., to build a railroad to White Oaks, to develop the White Oaks coal-fields.

HUNDREDS of locations have been made at Carson, on the hill where the strike in the artesian well was made.



## Mining in Costa Rica.

E. G. Gaertner, formerly of this city, but for some years past superintendent of La Union mine, Costa Rica, is on a short visit to San Francisco on business connected with the mine. In conversation with him we obtain some facts concerning the mining industry of the region, which will be of interest to our readers.

Costa Rica is comparatively little known as a mining country. The only mines worked there were Aguacate and the surrounding ones, which were opened as early as 1826 and which yielded a large amount of money. The output was estimated by various persons at from eight to twelve million dollars. It would seem strange that Costa Rica should be the only spot on the American backbone void of minerals. Colombia to the south and Honduras to the north are yielding steadily. Of late attention has been called to the deposits of low-grade gold quartz found within the confines of Costa Rica.

The veins are, as a general thing, large, and the vein matter is composed of quartz, lime and talc. The country rock is porphyry. Water and wood for fuel and timber purposes exist in abundance. During the last two years immense strides have been made in developing the deposits, especially in the case of two of the mines—one the Trinidad and the other the Union. Veins of from 20 to 60 feet in width and containing no less an average than \$15 per ton in free gold have been developed. The first one of the above-mentioned mines was sold to an English company for \$300,000 gold, while the other one is under bond to a syndicate of this city for a much larger sum. The situation of these mines is particularly favorable, as they are in plain sight of the ocean and close to an excellent port (Punta Arenas). What retarded the progress of these mines most was the insufficient knowledge of modern machinery and its application by the owners; but of late this has been remedied. Machinery which was formerly obtained in the East is now ordered on the Pacific Coast, which well deserves its reputation. The small difference in price is amply made up by superior quality, and the 60-stamp mill recently furnished by the Union Iron Works of this city may well be called a model of perfection. The Union mine has now 40 stamps and the Trinidad has 60, admitting of an output which will only be equaled by some of the largest mines of this country.

In regard to labor, the ordinary peon gets \$15 a month in Costa Rica money, which is about equal to \$10 gold. The miner gets from \$20 to \$23 silver, which amounts to much less in American gold. The mines are opened by adit entirely, and no pumping works are required. Although the country is very thickly wooded and very broken, and from the Union north toward Nicaragua without any habitations, the country would be a fertile field for prospectors, inasmuch as in the limited space with which Mr. Gaertner is familiar he knows of at least a dozen auriferous veins, each one of them paying from \$10 to \$12 on the surface.

The climate is very healthful; the elevation of the mines is about 2000 feet above the level of the sea. Any one can take up a mine there, and the first discoverer is given the right to two claims, each 200 meters in length. Land for water-right or timber purposes can be bought from the Government at a very reasonable rate. A tract of 2500 hectares (6500 acres) is reserved by the Government for the benefit of the mining community so that they can catch the timber, etc. This is done in each mining district. All machinery and articles necessary for mining are admitted free of duty.

The security of the country is such that the

Union Company have been enabled to send their gold in quantities of upward of 25 pounds by one man without arms or escort—in fact, a highway robbery is a matter entirely unknown. Mr. Gaertner says he has seen something like \$200,000 in silver brought down in ordinary boxes and as ordinary freight.

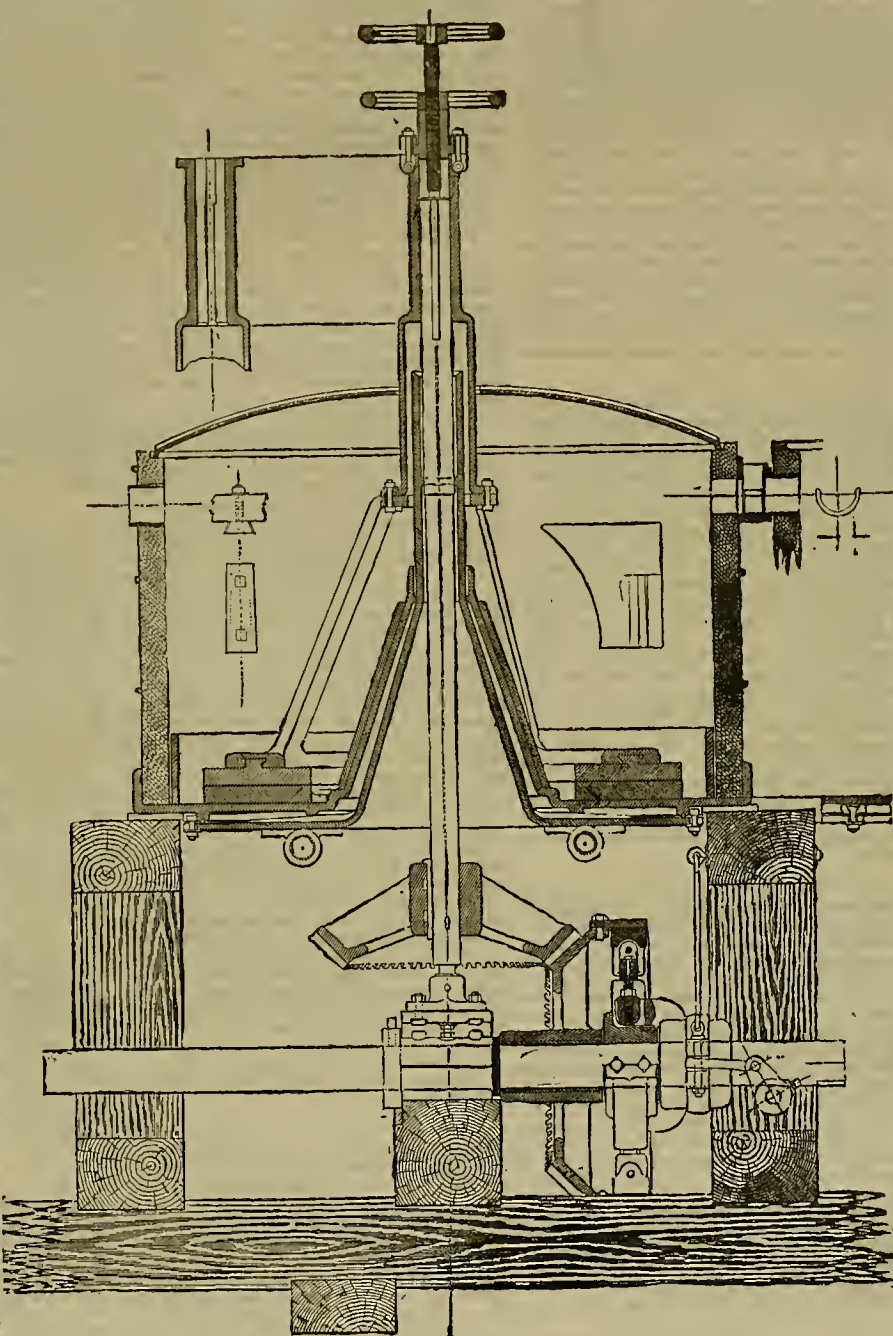
Provisions such as the country produces, beans, corn, rice, etc., are cheap and easily obtained. Articles of luxury, however, are taxed by a considerable import duty. Connection with San Francisco is made by means of the Pacific Mail Steamship Co., two steamers southward and one northward each month. The mines are about 25 miles from the port of Punta Arenas.

There are no custom-mills in the country. There is only one other mine besides the two

## The Boss Amalgamating Pan.

The pan used by M. P. Boss, in his Standard continuous mill, and shown in the accompanying engraving, differs but slightly from the combination pan in general principles; the cone is larger in diameter and the steam chamber extends into the cone, thus increasing the heating surface.

The great difference from the ordinary pan is in the manner of taking power. The Boss pans are not driven by belts, but are directly connected with the line shaft by beveled gearings. The spur-wheel has a long hshbitted hub and is fitted to run loose on the line shaft; back of the teeth it is fitted with an expansion ring of malleable iron. This ring is held in place by pins which are threaded into the expansion



SECTION OF M. P. BOSS' STANDARD PAN.

mentioned belonging to private companies. There is a little work done by astras. Both of the mines are gold mines, with no silver, and but a trace of lead.

**A NOTABLE REMOVAL.**—The old-established house of John Taylor & Co., assayers' materials and mining supplies, have taken the large corner store in the Donahue building, corner First and Mission streets, and the Union Iron Works have taken offices on the same floor with them. This is another move to Mission street and shows a tendency of the wholesale trade to drift in that direction. As the north side of Market is already built up with business blocks and extended out as far as Eighth and Ninth streets, the spread would naturally be toward the south and Mission and the cross streets in that direction, and with new modern structures must make this section desirable.

ring, but fit loosely in the pinion-wheel.

The collar of the pinion-wheel, which is under the expansion ring, has two radial arms, the ends of which are fitted with shoes having the curve of the expansion ring. These shoes have a brass bushing to prevent wearing.

The shoe is connected with the collar by a toggle, which is worked by a lever running up through the pan floor. By means of this lever the shoes are made to engage the expansion ring, thus forming a friction clutch and communicating motion to the spindle of the pan.

The shoe of the friction clutch is adjusted by means of bolts set in the toggle.

THERE were shipped from Calistoga, Napa county, 729 flasks of quicksilver last month. The Sulphur Bank mine produced 274 flasks; Napa Co., 235; Bradford, 159; and Great Western, 61.

## Mining Stocks and Mines.

It is notable that with the increase in importance of the mining industry comes a corresponding decrease in the importance of mining stock exchanges. With an increase of product from the mines comes a decreased volume of sales of mining stocks.

Last year the mines of the United States produced more bullion than ever before. Last year saw the inauguration of two new mining-stock exchanges, one at Portland, Oregon, and the other at Helena, Montana, and both of these were failures. The mining-stock business in New York is insignificant, and in this city it never made a poorer showing than at present.

The truth is that legitimate mining—working the mines for their product—has gradually crowded out the stock-jobbing feature. The actual value of a mine in no way depends on the quotations of its stock in the exchange. In fact there is scarcely one of the good mines of California that is even listed or called at our exchange board. What little dealing there is, is in the stocks of Nevada mines mainly, and even there the mines are daily becoming more and more independent of stock-board influences.

In fact, the public some years since learned the lesson of keeping out of stocks. Not one man deals in them now, where there were hundreds years ago. The manipulations of the insiders were such that "outsiders" had little chance of making any money. But the dodges and tricks are all pretty well known now, so there is scarcely business enough for the brokers to pay office rent and clerk hire.

If the listing of a mine on the board was any guarantee of its value, it might be different. But no experts of the board make any examination, and nothing is exacted but a listing fee. As a result, all sorts of wildcats have been listed, and the best mines are not heard of in stock circles.

The evils of stock gambling have been enumerated time and again. It does not matter whether stocks represent mines or anything else, but with mines there seemed more chance for forcing fluctuation and consequent speculation. The original idea was well enough when the mines were supposed to be developed by a number of people who paid or received profits in proportion to the interest held. But the whole thing finally drifted into a gamble. A few men were made very wealthy and a very great number were made poor.

It is not probable that the lost position of the mining-stock exchanges will ever be regained. And it is well that it is so. There is plenty of money to be made in mining when the business is properly followed, but the stock system has not realized its mission in developing mines. The people have found this out and care to follow it no longer.

**NOT IN CONTEMPT.**—In the matter of the alleged contempt of the Omega Mining and Ditch Company in violating the decretal order of the United States Circuit Court in the famous debris case of Woodruff against the North Bloomfield Gravel Mining Company which was referred to S. C. Houghton, Master in Chancery, to take testimony and report the finding of facts and conclusions, the decision of the Master was filed exonerating the defendants. He decides that the prosecution failed to establish the offense charged.

**TOPOGRAPHICAL CAST OF SAN DIEGO.**—Mr. Isaac Winston has recently completed a plaster cast showing the topographical features of San Diego and vicinity. It is about six feet square and weighs 700 pounds. The horizontal scale is six inches to a mile, and the vertical scale is exaggerated as is usual in these casts. San Diego, the bay, Point Loma, Coronado beach and a portion of the ocean are shown. The work is well done, and the cast gives an excellent idea of the locality.

THERE is a prevalent rumor that an agreement has been arrived at between the Grand Central and the Contention Mining Co., Tombstone, A. T., to put in new pumping machinery jointly in the Contention mine, which is now lying idle, owing to the inability to handle the water. When it shut down the mine had nearly 200 men on its pay-roll.

THE fire in the Calumet and Hecla mine is still burning.



## MECHANICAL PROGRESS.

## Decay of Iron—Groton Iron.

A short article in a recent number of the *Industrial World* says that the statement has recently been made by a practical iron-worker of 50 years' experience that not only does that metal rot from age, but that continual jarring has the effect to weaken its tensile strength, an illustration of a familiar kind in this line being afforded by the step of a carriage, which, when new, may be bent back and forth without breaking, but after a few years' service will certainly break, no matter how well preserved.

This same loss of tensile strength is noted in carriage springs; the poorest may be safely relied on for a year, but even after that short time they begin to break, and those, too, of the best quality will break after years of constant and exacting service.

It has been found that old crowbars, made of the best Swedish iron, and used by the early settlers of New England, have become so rotten that they could not be welded when broken, and had an offensive smell when the welding heat was applied.

Formerly, all iron was wrought by the trip-hammer, which scattered all the brittle and worthless material, but rolling makes it possible to run bars through containing poorest stock.

The *World* is slightly mistaken, however, in the statement that the old crowbars were made of "the best Swedish iron." On the contrary, the iron was mined and manufactured in the town of Groton, Mass., the site of the forge and furnace being recognizable to this day.

It is a well-established fact that iron becomes crystallized by continuous jarring and hammering; car axles are condemned after being in use for a certain length of time, and cannon are thrown aside after being fired a certain number of times.

The peculiar odor described above as an "offensive smell," emitted by the "old" iron at a welding heat, is characteristic of "Groton" iron. It is probably caused by certain chemicals combined with the iron, probably sulphur, and perhaps phosphorus.

In welding this iron great care has to be observed, and so much skill is necessary that it is regarded as a test of excellence, among the local smiths in Massachusetts and New Hampshire, to be able to "weld Groton iron." The peculiar odor of the iron much resembles that of a striped snake when the reptile is made angry. To weld the iron a good heat is necessary; then lay the pieces together carefully, press with a heavy hammer without striking, or squeeze the two pieces in a vise. This treatment will usually cause them to "stick," and the work may then be reheated and the weld finished up in the usual manner.—*Manufacturer's Gazette*.

## The Effect of Repeated Heating on Iron.

A. Elink Sherk of Haarlem, Holland, writes to *Engineering* on an accident which involves a very interesting point:

In September, 1885, an iron chain was hung over a sheave in and at the top of the chimney of a pumping engine of the drained Haarlemmer lake. By this chain a man had to be hoisted up now and then to the top, about 92 feet high. The chain was of 5 16 inch iron, and furnished some days before it was hung by one of the best-reputed Dutch chain manufacturers, who declared, by writing, it was tested to 2970 pounds. It was a relatively very expensive job, as we paid \$10 per cwt., but money was thought to be of no account in a case where a human life depended on good material and workmanship. In the past month of September, i. e., "two years after the chain was hought and hung in the chimney," one man, sitting in a little wooden chair, was hoisted up. When he got about the middle of the height the chain suddenly gave way and the man tumbled down. Most fortunately he was not killed, and not even seriously hurt. On examining the broken chain, I found it to be neither worn nor rusty; but, besides the links that were broken in pieces, several others had burst quite through in the same manner as cast iron does. The iron of these links is very brittle, and shows on the whole surface of the fracture no fiber at all, but a flat crystalline plane of a not very coarse grain and a high brilliancy. When it was asked of the manufacturer how he could warrant for 2970 pounds a chain that was broken under a charge of some 160 pounds, this gentleman answered: The chain had been quite right, but, hung in a chimney, "it was impossible it should keep well, for, when perpetually cooled down after being heated without any working (hammering) the iron gets loose and hard, and consequently it is easily broken."

As for this "perpetually cooled down after being heated," I have to observe the highest temperature in the chimney (at its bottom) remains between 630° F. (melting point of lead) and 680° or 750° F. (melting point of zinc). The chain has been exposed 35 times to this heat, and as many times it has cooled down to the temperature of the surrounding air. It is unknown to me, and, as I discover now, to many others, that good wrought iron may be completely spoiled in the circumstances I mentioned. The chains hanging in the chimneys of our other engines, now already four and five

years, though heated and cooled down in exactly the same manner, do not show traces of brittleness or weakening; but we got those chains from another person; they were not warranted, and not nearly so expensive. Still, if the manufacturer of the broken chain is right, if good wrought iron may indeed lose some 95 per cent of its tensile strength under circumstances such as I have described here, this fact is well worth making generally known, in order that accidents might be prevented.

**BRITTLE IRON.**—It is well known to artisans engaged in the working of wrought iron that if a piece of the very best and toughest iron is hammered in the process of forging until it ceases to be red hot, the effect of such cold hammering, as it is termed, is to cause the iron to become so brittle that it will in many cases break across in the process—or if it does not at that time this process of cold hammering so removes and destroys its tenacity as to render it capable of being broken with the slightest blow. In remarking upon this process, Mr. Nasmyth, a well-known authority, has lately expressed the opinion that, though such a practice is by no means to be considered inherently wrong, but just the reverse, the evil rests in applying such a cold-hammered piece of forge work to its purpose without having been passed through the curative process, which is simply this, namely, to heat the piece of work in question to a dull red heat, and lay it down to gradually cool. By subjecting wrought iron to the most violent hammering or compression at a low temperature, and then submitting the iron work so treated to the simple process referred to—heating red hot and slow cooling—the tenacity or shock sustaining qualities of the article are enhanced at least 20 times. In most cases the process in question of hammering and a softening is necessary, in order to insure the requisite finish and nice surface, the forgings so treated requiring, too, the least possible labor subsequently.

**LUSTERLESS SURFACE ON STEEL.**—A finely polished lusterless surface on tempered steel can be procured by either of the following operations: After the steel article has been tempered it should be rubbed on a smooth iron surface with some pulverized oil-stone until it is perfectly smooth and even, then laid upon a sheet of white paper and rubbed back and forth until it acquires a fine dead polish. Any screw-threads or depressions in the steel must be cleaned and polished beforehand with a piece of wood and oil-stone. This delicate lusterless surface is quite sensitive, and should be rinsed with pure soft water only. A more durable polish is obtained by first smoothing the steel surface with an iron polisher and some powdered oil-stone, carefully washing and rinsing. Then mix in a small vessel some fresh oil and powdered oil-stone, dip into the end of this mixture the end of a piece of elder pith, and polish the steel surface with a gentle pressure, cutting off the end of the pith as it commences to become soiled. In conclusion, it should be thoroughly cleansed in soft water, when the article will be found to have a fine white, lusterless polish.

**REPAIRING WHEELS.**—In repair shops we sometimes have wheels of family carriages and other valuable light wagons brought in for repair. These wheels are good in almost every respect except that the spokes are slightly loose in the hubs, the cause being the driving of the wagon with the tires loose. To repair such wheels and make a good job, remove the tires and rims, then fasten the hub on the wheel top, draw out the spokes, and if any of them are crooked put them in an oven or some place where you can warm them slowly. When warmed as hot as they can be without injuring the paint, take them to the vise and straighten them; when they are cold they are ready to be driven back in the hubs. Use good glue, and if any of the spoke tenons seem to be too thin, cut a piece of canvas the width of the tenon and use as many thicknesses as are needed to fill the mortise. Be sure to allow the wheels to stand undisturbed until the glue is thoroughly hard before driving on the rims. When the rims are on, set the tire in good shape, and the job is completed.—*Blacksmith and Wheelwright*.

**A MACHINE FOR TESTING RAILWAY TIRES.**—One of our foreign exchange illustrates and describes a machine for testing steel railway tires by percussion, in use at the works of the Chemin de Fer du Nord, at La Chapelle, Paris. The object of the machine is to give a succession of blows like those of a sledge-hammer, but in quicker succession, more regular in point of interval, and more uniform in intensity. To this end a pair of wheels with their tires shrunk on end keyed on their axle is made to revolve slowly on live rollers, while a couple of sledge-hammers are brought down on the tires at regular intervals by a motion like that of the old tilt hammer, a pair of hammer springs being interposed for giving elasticity to the blow.

**ENLARGING A TIRE ON A WHEEL.**—A correspondent of the *Blacksmith and Wheelwright* says he has done it in the following manner:—"Drive the felloe out so that a little more than half of the face of the tire shows for a few inches in length of the tire. Take a small fuller and a hand hammer, set the tire on the anvil, draw one edge of the tire, drive it through to the other side and draw the other edge, but do not draw too much or your tire will be loose."

## SCIENTIFIC PROGRESS.

**IS TYPE-WRITING TO SUPERSEDE TELEPHONING?**—A machine which has been named "dynamograph"—an electric type-writer—has recently been patented at Washington and pronounced by one of the Patent-Office examiners as one of the most important of recent inventions. The instrument in appearance somewhat resembles an ordinary mechanical type-writer. It has a key-board, and the types are placed on steel bars, which play upon a common center, as is the case with the type-writer. The motive-power used is electricity, by means of which evenness of action is assured. No matter how heavily or how lightly the keys are struck, the impression on the paper is the same. A remarkable feature of the invention used as a type-writer is, that the carriage moves automatically both forward and backward. When the end of the line is reached, the carriage returns to the starting-point without the aid of the operator, and the paper bar moves one notch, so that all that is required of the operator is to depress the keys. The most important field for the new invention is said to be in connection with the telegraph, since the instrument can be used both as a transmitter and receiver of intelligence over a single wire, no matter how great the distance may be. The receiving instrument does not require the attendance of an operator, but prints the dispatch automatically. The instruments at both ends of the line print the dispatch sent, and so a safeguard against mistakes is provided. It is said that the electrical type-writer will be valuable as a local aid to business, and offers many advantages over the telephone. One advantage put forth is, that no matter whether a person called up is at his place of business or not, the message can be printed through the medium of his type-writer, and will be there for personal on his return. The dispatches printed are in letter form and not on endless tape.

**THE NEW GLASS FOR MICROSCOPES,** to which we have already made several allusions in these columns, is still attracting much attention, and seems to be producing remarkable results. This glass possesses so high a refractive power as to be rid of what is known as the secondary spectrum lenses, and therefore does away with that confusion in the focus which formerly existed in the best lenses. Employing these new lenses, Dr. Dallinger, an eminent English naturalist, states that he has been enabled to discover a remarkable organism, which is endowed with six motile fibers, and which acts as a sort of gleaner in the putrefactive fluid, the object of the existence of these organisms, he says, in the putrefactive fluid being to break up the decomposing animal and vegetable matter into its original elements with carbon, hydrogen, nitrogen and the rest, in order that, set free, they may go again to the building up of organic forms. This organism, it appears, lingers in what has hitherto been considered an exhaustive liquid to break up the minute particles still left, and to this end is endowed with an extraordinary power of motion, this being partly grinding and partly impact with motion; a group of these organisms can be observed about a minute speck of decomposing matter, rapidly breaking it up, until it has wholly disappeared. Dr. Dallinger also says that he has been able, by the same lenses, to make discoveries on the obscure but important question of the existence and meaning of the nucleus in these minute organisms, demonstrating, in fact, that every important change taking place in the organism, from its earliest development to its latest phase, was preceded by profound changes in this exquisitely minute nucleus.

**ARTIFICIAL SILK.**—M. De Chardonnet dissolves 3 grms. of nitro-cellulose in 100 to 150 c. c. of a mixture of equal parts of alcohol and ether. He adds 2.5 c. c. of a filtered solution at one-tenth of the dry ferrous chloride of commerce in alcohol, or of stannous chloride, and further 1.5 c. c. of a solution of tannic acid in alcohol. The whole is filtered in a closed apparatus to prevent loss by evaporation. The liquid is placed in a vertical reservoir, having at its bottom a blowpipe nozzle of glass or platinum. This pipe forms an acute cone with an orifice of from 0.10 to 0.20 mm., the thickness of the margin not exceeding 0.1 mm. This aperture opens into a vessel of water acidulated with one-half per cent of mono-hydrated nitric acid. The level in the reservoir being some centimeters higher than in the vessel of water, the outflow proceeds easily. The fluid thread hardens at once in the acidulated water, and may be drawn out by a uniform movement. The thread thus formed must be dried rapidly by traversing a current of dry (not hot) air, and may be wound up as soon as dry. It is gray or black, but a number of soluble coloring matters may be introduced into the ethereal solution, thus obtaining threads of all colors.

**"BLIZZARD."**—The term "blizzard" has been quite generally in use in various parts of the country for many years, and we can see no good reason why it should not be found in Webster's unabridged. An exchange gives the following as the origin of those peculiar "cold waves" which have recently swept over our northern border with such terribly destructive effect: "The blizzard" originates somewhere far up within the arctic circle and sweeps across British North America, through a sort of funnel formed by the Laurentian mountains on one side and the

Huronians on the other, rising in some parts 4000 feet, while on the Saguenay river the gorges form sheer cliffs 1500 feet high. The blizzard strikes against the western limit of this rocky barrier and is deflected so that in Wisconsin, Eastern Minnesota, Michigan and Illinois its force is broken. From that point, and the Rockies and Sierras further south, there is an unbroken plateau to the Gulf of Mexico, where the blizzard disports itself unchallenged. South of the mountains the Arctic currents are less severe. Manitoba is only a mid-station in its career.

**FINE RULING.**—Dr. H. A. Rowland of Johns Hopkins University has a new machine for ruling his glass plates for spectrum analysis or decomposition of light, which will inscribe 40,000 lines to the inch. The machine which he has heretofore used would rule only 10,000 lines to the inch. The ruling is done by a small diamond point which runs across and draws the line while the plate is stationary. It is a matter of infinite care, and several days are necessary for ruling a plate three or four inches in diameter. At the end of the engine is a small counting-machine for recording the number of lines drawn. In an adjoining room is a very costly instrument for measuring the width of the lines, and so marvelously accurate is it that an error of one-hundred-thousandth part of an inch, or even less, can be detected. The rulings of this machine are the finest in the world. This engine was made entirely at the University under the personal supervision of Mr. Rowland, and is the result of the most careful, painstaking effort. The most important part of it—the screw and its attachments for regulating the width of the lines—was carefully ground under water kept at a constant temperature, so as to avoid all error arising from expansion and contraction, and is guarded against so small an error as one-hundred-thousandth part of an inch. The engine is run by water-power, and is inclosed in a glass case, and kept in a double-walled brick chamber in the basement, so as to provide as equable temperature as possible. So delicate is the machinery that while it is running the case is kept closed, as the heat from a person's body would affect it.

**UTILIZING ELECTRIFIED BALSAM.**—According to *Engineering*, Mr. C. V. Boys has described an interesting experiment he has made with electrified gums and balsams. If sealing-wax or any such sticky material is melted in a cup and put on the conductor of an electrical machine, it throws out threads and fibers, which break into heads. The cup containing the gum should be inclined from the operator and the electrical machine before the latter is worked, else both will be covered by an invisible sticky web. Burnt india-rubber also sent out the filament; but Canada balsam appears to show the phenomenon best. When a candle flame is held near a cup throwing out such filaments they shoot to the flame and sometimes cover the candle, and sometimes discharge into the flame and turn back into the cup. In a few minutes a large quantity of these sticky threads can be made, and, as they break into heads, Mr. Boys points out that this plan can be used to pulverize these substances, which are not easily pulverized in the ordinary way.

**NOCTURNAL PHOTOGRAPHY.**—Various methods have been introduced for the accomplishment of nocturnal photography, and some of the most beautiful landscape views taken at night by the light of the full moon have been produced in France, the time of exposure of the plate being one hour. The clearness of the photograph is wonderful, and, except for the lights in the buildings and on the bridges, and their reflections in the water, the picture could hardly be distinguished from one taken in the daytime.

**A NEW INSULATING COMPOSITION** has been brought out by Mr. N. W. Merritt of Somerville, Mass. It is flexible, fairly tough, and unalterable by moderate changes of temperature. It is made by adding one quart of water to two pounds of sodium silicate; with this is mixed one pound of tar and the whole heated. While hot, four pounds of asbestos waste and one ounce of sugar are stirred in, and a little dilute nitric acid added, which completes the operation.

**PHOTOGRAPHIC METEOROLOGY.**—M. Janssen, the French physicist, considers the camera a valuable addition to the instruments of the meteorologist. He has exhibited to the Academy of Sciences some fine pictures illustrating the characteristics of mountain clouds at the different hours of the day. The "sea of dawn" of early morning undergoes interesting changes through the action of air currents set in motion by the sun.

**ONE OF THE SEA'S DANCOERS.**—A curious acoustic phenomenon, sometimes observed at sea, has been termed by M. Fizeau the "mirege of sound," from its analogy to certain well-known phenomena of light. The sound-waves are deflected upward to a very marked extent under the influence of strata of air of various temperatures, and to this effect are ascribed numerous collisions between vessels having powerful fog signals.

**THE GASTRIC JUICE.**—Dr. Buhejinski of St. Petersburg has found that the gastric juice is less acid during sleep than at other times.



## ENGINEERING NOTES.

## A Gigantic Undertaking.

## A Proposition to Bridge Over the English Channel.

The *Evenement*, an influential French journal, says that there is a scheme for bridging the English channel under active consideration among French capitalists. Admiral Cloué is at the head of the project, and has connected with him three well-known engineers, Messrs. Hersey, Fowler and Baker, the two latter representing England in the matter. The plans have already been prepared, and are at present being examined by skilled engineers at the Crouxot works. As the *conseil supérieur des ponts et chaussées* is not unfavorable to the scheme, as soon as the plans are approved active measures, it is expected, will be shortly begun. It is estimated that the cost will be somewhere about \$200,000,000, and the time required before it can be completed seven years or more. The course proposed to be taken for the bridge is from Cran-sax-Élofs, a little place on the French coast between Ambleteuse and Cape Gris Vert, to Folkestone, on the English side, a distance of about 22 miles. Not the shortest, but the shallowest line will be chosen. The depth of the channel is supposed to be much greater than it is in reality. There are two shallows between the two points where the depth is only about 20 feet, and they will, of course, make a material difference in laying the foundations. From the French coast to the first of these shallows the depth is about 160 feet, and from the other shallow to the Folkestone about 100 feet. The bridge will have two slight bends, the first deviating a little to reach the Wans, the other falling back to reach Folkestone.

Huge piles will be required for the support of this great structure. The piles proposed will be blocks of concrete and masonry 100 feet long by 100 feet broad, and will be placed at intervals of about 550 yards. The measurements sound enormous, but it is stated to be quite possible that they may have to be increased to give the bridge a strength capable of bearing a weight of 25,000 tons. The causeway of the bridge will be about 160 feet above the sea level, so that vessels of any size may be able to pass beneath it. It will be 100 feet wide and be divided into four lines for train service, as well as a way for foot passengers. Signal-boxes and sidings will be placed along the whole length at equal distances. The bridge will be illuminated by electric light, each pile having a powerful electric lamp attached to it, as well as fog-horns and alarm bells for use in foggy weather. Such are the outline details of this enormous undertaking, which the projectors state they have full confidence will be before long carried out. The *London Times* gives the particulars of the scheme without any special comment pro or con.

**RUSSIA'S GREAT RAILROAD.**—Russia has just positively resolved to undertake one of the most colossal railroad enterprises of this generation. Next spring work will be begun on an Asiatic trunk railway, to stretch from Tomsk across Siberia to the Pacific by way of Irkutsk, Strélnik, Khenkat or Hankoi to Vladivortok. The work is expected to be completed in five years. Communication between St. Petersburg and Ekaterinenburg is already established, and a line to Timmen is in progress. That covers only about one-third of the distance, and from Timmen the line joins Tomsk, above alluded to. The work of construction will be carried on from both ends. The line will be of great advantage in developing the resources of Siberia, and it will enable travelers to cross from the Pacific to St. Petersburg in something like 15 days. Much stress is laid on its strategic importance, giving, as it does, a chance by the transport of troops to cover the Chinese frontier. That in the meantime the introduction of Russian petroleum into Eastern countries will be pushed with renewed energy and perseverance is certain. The struggle between the American and Russian articles in that direction will thus receive great impulse, and we do not fail to point this out to the petroleum trade, as the fight is likely to be a close one.

**THE BRIDGE OVER THE STRAITS OF MESSINA.** To give railroad connection between Italy and Sicily, appears to be taking practical shape. The place selected for this great undertaking is where the channel is some 2½ miles wide and 361 feet deep. Two piers will support the viaduct or steel rails at the height of 328 feet above the water. If this work and what may be called its companion-work across the English channel are ever completed, they will constitute the two most wonderful works of engineering ever attempted.

**COMBINING THE ELEMENTS.**—One of the latest attempts to harness the forces of nature for the service of man is the adaptation of a wind-mill for the turning of a dynamo, the electricity thus obtained being stored in suitable batteries and afterward used in lighting basons for the benefit of the maritime interests. There is a station of this kind near the mouth of the Seine, and considerable success has been obtained.

**THE MINING AND SCIENTIFIC PRESS** for Feb. 4th is a valuable number. It devotes many pages to a thorough summing up of the mining interests of the coast. Wood River is awarded the prominence due to it.—*Hailey Inter-Idaho*.

## GOOD HEALTH.

## Cure for Dandruff.

**EDITORS PRESS:**—One of your "Constant Readers" asks for a dandruff cure. If the directions I am about to give be faithfully carried out, dandruff will disappear at short notice. My wife being troubled considerably that way, I applied to Dr. L. W. Case, professor of skin diseases at the Rush Medical College of Chicago, and he prescribed as follows: At night before retiring rub the scalp, in fact, saturate it with oil (hair oil, lard, olive oil), anything will do. Spend 15 minutes in rubbing it well into the scalp, tie a towel around your head and retire. Next morning wash the scalp with sulphur soap thoroughly, then rinse off every particle of oil and soap with clean, warm water, rub dry and comb. After the head is perfectly dry and all soap and oil have disappeared, make a mixture of four ounces of rose-water, one ounce of glycerine and five drops of carbolic acid, and use this once a day for a week, in place of hair oil, rubbing well into the scalp, and thereafter as often as you like in place of other hair oil, but not less than twice a week. This mixture can be perfumed to suit. Friction keeps the scalp healthy, and at least five minutes should be spent every morning rubbing the head with the tips of the fingers. If these directions are followed, dandruff will disappear and the hair will stop coming out. Wash the head once a month with sulphur soap, after saturating with oil the day before.

Chicago, Ill.

WILLIAM WEINER.

## Car Fumigation.

The *Oakland Enquirer* in the following article describes the precautions taken by the railroad people to prevent the spread of smallpox on all their local trains at the Oakland point:

During the recent smallpox scare in San Francisco and Oakland a general system of fumigation has been quietly going on upon the incoming local trains of the railroad company, but so little has been said about it that few persons outside of the railroad employ are acquainted with the manner in which the process is carried out. A small tin pail, equal in size to the common lard-bucket and mounted upon four short legs, is placed in the car to be fumigated. The bottom of the pail is then covered with a coating of plaster of paris to the thickness of 1½ inches; over that one-fourth of a pound of sulphur is sprinkled, a little alcohol is applied, and a match touched to the latter, which instantly sends up for the space of half an hour such strong and penetrating fumes as to cause all present to vacate and remain outside the car while the process is going on. At the end of the half hour the car-doors are opened, and as soon as the fumes have escaped the car is thoroughly cleaned, swept and dusted, leaving no trace of the burning sulphur behind.

When, however, a suspicious and extraordinary case is reported upon a train, the car wherein the case was found undergoes a much longer and more vigorous process than the first. In the latter case a paste composed of equal parts of manganese and common salt is made and placed as before in the little pail, over which is then poured 90 per cent of sulphuric acid, which develops chlorine gas. The preparation is decidedly the most thorough in its effects, although being highly detrimental to the silver and plated finishings and ornaments contained in the car, and is only used, as before stated, in exceptional and urgent cases.

**HEALTH HINTS.**—A man had a finger nail torn off, causing very great pain; brown sugar was thrown on a pan of burning coals, and the finger held over the smoke for 20 minutes. The pain was removed, and in due time a cure was effected. In *Health at Home* it is narrated that a horse seemed to be dying of a festering wound. Some old shoes were put up in a hog-troth and set on fire under the horse, so that the smoke would reach the wound. In a few hours the swelling began to subside, the wound discharged, and the horse got well. An old lady was knitting a stocking. A member of the family came in with a painful wound. She unraveled the stocking, put the yarn on a shovel of burning coals, caused the smoke to ascend against the wound, giving immediate relief. The first thought of ordinary readers is that of wondering that such a "simple" thing should have such beneficial effects. Instead of burdening the mind with the remembrance of old leather, and brown sugar, and yarn stocking, it is better to ascertain the general principles; for one may have the most agonizing sore, and be a thousand miles from an old shoe, or spoonful of brown sugar, or a yarn from a stocking. What then? In all cases there was smoke; out of smoke creosote is made, and carbolic acid is of the same essential nature, hence the application of these useful substances to all varieties of wounds, burns, and sores. Their essential nature is two-fold—they arrest decay and purify.—*Hall's Journal of Health*.

**THE OBJECT OF COOKING THE FOOD** is to dissolve the adhesive substance which binds the fibers of food together, so that the digestive fluids can the more readily act upon every part of the food. "The starch granules of corn, wheat, rye, and other grains, with those of the potato, turnip, and other vegetables, are very difficult of digestion in a raw state. The digestive fluids act upon them slowly and only

with great difficulty, owing to their insolubility. When subjected to heat, these granules swell very greatly in size, and rupture, when they become easily soluble. This effect of heat is familiarly illustrated in the parboiling of corn, the effect upon the whole kernel being due to a similar effect upon each individual granule. The indigestibility of raw fruits is due to unruptured starch granules which they contain; hence they are improved by cooking."—*Pacific Journal of Health*.

**THE INDIAN AND PHYSICAL PAIN.**—The general idea that the Indian endures pain stoically is not sustained by the observations of Dr. Corbier among the Apaches. He says that "they do not endure physical pain any better, if as well, as the whites. Great or continuous pain renders them stupid, and oftentimes delirious, and the stolidity with which Indians in general are credited is not well maintained by them under small surgical operations, the ones of tooth-extracting almost always eliciting a groan or a yell."

**DO YOU SMOKE?**—Hundreds of boys, says the *Scientific American*, apply for enlistment in the United States Navy, but are rejected because they cannot pass the physical examination. The first question is, "Do you smoke?" The invariable response is, "No, sir;" but the tell-tale discoloration of the fingers at once tells the truth.

**ALCOHOL AND WAR.**—We spend hundreds of millions a year for alcoholic drinks as a luxury, and by it send more people to the grave in one year than are carried thither in ten years of war.

## USEFUL INFORMATION.

## Correcting Dents and Soars.

Fine surface painting on wood is liable to accidents, some of which compress the wood without breaking the layer of paint and varnish, others scar the varnish without reaching the wood, and still others dig deeply into the wood. Wheeled vehicles require to be handled by three branches wholly different from painting, and therefore are very liable to meet with accidents through the carelessness of tools. Indeed, it is a rare thing for the carriage painter not to have to patch up one or more bruised spots. The dent, when but slight, may be corrected by acting on the natural property of the wood for shrinking and swelling under the effects of heat and moisture. The force of the blow having been only sufficient to compress the fibers of the wood, the introduction of moisture to the part will cause the grain to swell or assume its former place. A fine needle is used to pick a few holes in the dent and the part is then sponged over with water, which will soon cause the wood to rise.

Scars which do not reach the wood but still tear deeply into the varnish are ugly things to correct, especially so in finishing coat, and if the time can be allowed the better plan is to rub the entire panel, so as to bring its surface to the level of the bottom of the scar. After the rubbing has been carried as far as it is safe to go without reaching the color and the scar is still visible, it should have a coat of varnish, which, when dry, is to get a careful rubbing. A heavy coat of varnish on the panel will restore it.

The above way is to avoid puttying and coloring the bruised place, as it is so difficult to get a perfect match of the underlying color.

Deep bruises require that the broken fibers be removed and the wood primed, puttied, and filled up to the original level. The putty should be in two or three layers, allowing time for each layer to harden, the last layer to be mixed in varnish so as to bear rubbing with lump pumice-stone, the rubbing to be confined to the size of the bruised place, so as to avoid scratching the varnish more than is absolutely necessary. When rubbed to the proper level, wash clean, dry off and carry the bruises into the varnish, and, when dry, rub the panel and revarnish. Bruises over black, opaque-green and brown give much less anxiety than when a transparent color lies beneath the varnish, for the latter is difficult, we may say impossible, to match perfectly, and the only recourse is to repaint the panel.—*Painters' Magazine and Coach Painter*.

**MACHINE TOWELS.**—The American Silk Mfg. Company of St. Louis, Mo., are supplying the market with what they call machine towels, manufactured out of silk-waste. Cotton-waste, rags, litter, hemp, fiber, etc., the regular material used up to the present time, have disadvantages not only to the laborer, but likewise to the machines. Cotton-waste, when saturated with oil, easily inflames, and carries therefore with it constant danger of fire, besides being most lavishly used, as no traces can be kept of it. Rags and litter are objectionable on sanitary grounds. All of above-named materials lose more or less small particles of fiber by friction, which work into the finer parts of the machinery and in time affect them seriously. The machine towels, on the other hand, are claimed to entail no danger of spontaneous combustion, even if piled up in a heated and oily condition. They are further claimed to leave no fiber on any part of the machinery, to be superior for their softness, elasticity and capability of easily absorbing any greasy substances, and to possess the property of taking up and retaining in their meshes any rust or

particles of foreign matter with which they come into contact. We understand that they can readily be washed over and over again without losing any of their properties. The control is easily established by giving a certain number to the men, who have to return them after use. The general size of the wipers in demand is 14 inches square, though they can be furnished in any size desired. The washing, which enables the using of the wipers from 10 to 15 times, is done by allowing the greasy wipers to lay over night in a weak solution of lye and soap, to be rinsed out next morning in hot water. A simple boiling of the wipers in soda is also recommended.

**A STEEL STREET PAVEMENT** has recently been laid on Jackson street, Chicago, between Clark and La Salle streets, by the Iron Paving Company. It consists of steel strips about 2½ inches wide and one inch thick, rolled with a channel on the side exposed to traffic, and with notches about six inches apart. These strips weigh 11 pounds to the yard, and they are laid across the street about five inches between centers. The strips are only long enough to extend to the middle of the street, so that the proper slope from the center to the gutters can be secured. They are bolted together so that they cannot slip laterally, and are fastened to wooden sills. A bed of gravel composes the support for this pavement, while between the steel strips a mixture of pitch and cement is poured, which fills the interstices to a level with the tops of the strips and renders the pavement comparatively smooth. The paving company claim that experiments which they have made demonstrate the suitability of this pavement to city traffic. Its cost is a little less than the usual charge for paving with granite blocks.

**CURIOUS EXPERIMENTS.**—Some curious experiments have led Dr. Urbanschtich of Vienna to the conclusion that the exciting of one sense organ increases the acuteness of the others, the different sensations seeming to reinforce one another. Hearing a sound will bring out the just indistinguishable color of a distant disc. The ticking of a watch is heard more plainly with open than closed eyes, the fact that we listen to music or speaking with the eyes closed being due to other reasons. The sight of red and green increases perceptions of sound; that of green and red weakens them. These colors affect sensations of smell, taste and touch in like manner. Touch and temperature act reciprocally. When the skin is tickled and plunged into warm water, the tickling ceases; when into cold, the tickling brings out the feeling of cold. These observations offer an explanation of the singular associations between colors and sounds that some individuals retain.

**LETTER COPYING.**—To avoid the loss of time incurred in waiting the paper when a letter is to be copied, M. Leroy of Berlin has constructed a press with a hollow platform, made into a water reservoir, by the junction of a kind of double bottom in a pierced iron plate. Under this plate is fixed a sheet of felt, then a cloth or some other material; and the water, passing over the pierced iron, soaks the felt and cloth, giving them the proper amount of dampness. To copy a letter it is only necessary to place it under a piece of silver paper and give the press a turn. The moisture is transmitted to the silver paper, and the letter is copied.

**CEMENT TO Mend IRON POTS AND PANS.**—Take two parts of sulphur and one part, by weight, of fine black lead; put the sulphur in an old iron pan, holding it over the fire until it begins to melt, then add the lead; stir well until all is mixed and melted; then pour out on an old iron plate or smooth stone. When cool, break into small pieces. A sufficient quantity of this compound being placed upon the crack of the iron pot to be mended, can be soldered by a hot iron in the same way a tinsmith solders his sheets. If there is a small hole in the pot, drive a copper rivet in it and then solder over it with this cement.

**TO CALCULATE WATER IN A PIPE.**—To calculate roughly the quantity of water in any given pipe or other cylindrical vessel, it is only necessary to remember that a pipe 1 yard or 3 feet long will hold about as many pounds of water as the square of its diameter in inches. Thus: If we have a pipe 20 inches in diameter and 16 feet long, we have simply to square 20 (20² = 400), and multiply the result by the number of times 3 feet is contained in 16 feet = 5½ times; hence, 400 × 5½ = 2133 pounds. By increasing the result by 2 per cent, or 1-50, a more nearly exact figure can be obtained.

**A ROADBED OF SALT.**—In the Colorado desert, near Idaho, there is a large bed of rock salt, and the Southern Pacific railroad, in laying the track to the salt bed, has been obliged to grade the road for 1200 feet with blocks of these crystals. This is the only instance where the roadbed is laid and ballasted on salt. The sea, which once rolled over this place, dried up and left a vast bed of salt nearly 50 miles long. The supply is inexhaustible and the quality excellent.

**LONG-DISTANCE TELEGRAPHY.**—An extraordinary feat in telegraphy was accomplished recently when an interview took place by cable between London and Vancouver, through lines of wire equal to 7619 miles. A reply was received within six minutes from the Pacific side after the conversation began. The messages outran the sun by eight hours.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**PLYMOUTH.**—Cor. Amador Ledger, Feb. 18: Regular pay-day has come in Plymouth, and helped to liven up the town a little, but it does not tell when the next pay-day will come at the mine, as there is no work going on, except hoisting out water at the south shaft of the Empire mine. It seems to be generally understood, however, that the mine is going to be opened, and a general examination of that part of the mine that is or was on fire will be made. If the fire is out, it will put an end to the eternal waiting of the miners, and make all hands lively. There is more prospecting going on at the present time than ever before; the main reason for it is on account of the mine being closed down. Many of the men working for the company have locations that are thought to be valuable, and some of them have had considerable work done on them before this, so the owners during the slack time are busy running tunnels, sinking shafts, and generally developing their claims. T. Bawden has a tunnel on his claim north of town about 400 feet long, and expects to tap the ledge at a good depth next week. He has put in a track and a good car. He has some good rock from a shaft sunk on the ledge. Messrs. Ninnis & Pulch are working on their claim on the Ochre lead; it has always been a paying claim and we may have a strike to report before long. There are many more parties at work.

**TO SINK DEEPER.**—Amador Ledger, Feb. 18: Messrs. Stafford, Eaton and another gentleman, from Oakland, were in Plymouth last week for the purpose of examining the Chicago or Cupps mine, in which they are largely interested. It is reported that they expressed themselves as well pleased with the outlook, and that it is the intention to sink the shaft 200 feet deeper without delay. The miners of the Middle Bar tunnel were paid off the end of last week, the sum of \$1200 being sent up from San Francisco for that purpose. This was sufficient to pay over one-half the indebtedness. The balance of the creditors are willing to wait for awhile. Mr. Belshaw, one of the owners of the Kennedy mine, came up Sunday, and has been looking after the mechanical work at the mine during the week. They are preparing to put up new machinery at the north shaft, with other improvements, which tend to show the faith of the owners in the mine. The taking out of water from the main shaft, preparatory to sinking, is progressing slowly. It will take some time to get to the bottom, as the 900 level was entirely submerged. A cleanup has just been made at the Spagnoli 5-stamp mill at Clinton. About 700 tons of rock was crushed, which yielded an average of 77 per ton. The lead is small, and the ore hard, so that this yield will not do more than pay expenses.

## Butte.

**THAT COAL MINE.**—Gridley Herald, Feb. 16: Thomas Kersey, of the Buttes, is interested in the vein of coal recently opened near Sutter City, and informed us that the vein is two feet wide and gradually getting wider as it is followed in. Several experienced coal miners have visited the mine and are confident that the vein leads to a vast deposit of an excellent quality of canal coal. The coal has been tried on several blacksmith forges and gave satisfactory results. A crew of men are at work following up the vein.

## Calaveras.

**ANGELS.**—Cor. Union-Democrat, Feb. 18: As is well known, Angels is having a boom; and we believe it has come to abide with us. For 30 years no such activity and enterprise has been experienced in this section. The advent of capital and the intelligent, scientific application thereof is doing wonderful things. At the Lane & Utica mine, the lode has increased materially in width and in value, and now at a depth of 300 feet, the property has a larger lease of value and life than was ever dreamt of heretofore. The mine and mill are constantly under vigorous and systematic operation. Ten Frue concentrators were recently placed in the mill and the concentrators are sent at once to the chlorination works, now owned by Hayward & Co. The chlorination works have a large capacity. The Becktel mine is also in full operation and is paying well. Economical administration and cheapness of reduction make this property a veritable fixture. The Tozer works are looming up on the horizon of mining industries as a mammoth institution, and many more mining enterprises are now coming into tangible shape, which previous to the above vast undertakings were not regarded as feasible.

**COPPER.**—Angels Echo, Feb. 18: The work of extracting ore from the Union Copper mine at Copperopolis goes ahead as briskly as present facilities will permit. We are informed that there are about 40 men employed in this mine at present, with a fair prospect of an increased force shortly.

## El Dorado.

**PLACER MINE.**—Placerville Observer, Feb. 21: The Chili ravine placer mine, under the active management of Supt. Coughlin, have their tunnel in 1300 feet. They have their full mill of fine-looking gravel, and are now crosscutting to find a flat on the north side of the channel. If this should be found as Mr. Coughlin expects, the mine will be good for years to come. It was on Chili ravine below this mine that W. T. Coleman, the commercial king of San Francisco, made his first raise in California in 1849, and which proved to be the foundation of his now enormous wealth.

## Nevada.

**SLUICES ROBBED.**—North San Juan Times, Feb. 17: Wednesday night of last week several sluices belonging to Sam Crall and John Trood, situated in the American mine, were cleaned up by outsiders, supposed to be Chinamen. On that day the owners did not work, and that night the sluices were robbed. There was a month's hard run in the sluices, but exactly how much gold was taken from them cannot be known. One box, the one at the extreme lower end, was not touched by the sluice-robbers. It was subsequently cleaned up by Crall & Trood, and paid \$250.

**GRAVEL MINING NOTES.**—Grass Valley Union, Feb. 18: The machinery being erected on the Pet

gravel mine, at Randolph Flat, will be in running order about next Tuesday. Stronger machinery is being put up than was at first contemplated, and it will be sufficient to do the hoisting and pumping, however strong may be the flow of water, and to aid in whatever prospecting of the ground that may be undertaken. Cunningham & Co. continue to take out good pay gravel, but it is intended to put up a small mill for crushing, as it is found that the washing of the cemented gravel in sluices does not save all the gold, a considerable percentage being contained in the cement that does not dissolve by being washed by the sluice process. Pellet & Co., on Deer creek, have started up their mill for the crushing of gravel, and the prospects are quite encouraging, the gravel prospecting well.

**SINGULAR FORMATION.**—Transcript, Feb. 18: Between Washington and Phelps Hill, in this county, is a stratum of slate and plumbago about 300 feet wide, and it has been traced 2000 feet in length. The composite is almost as soft as pipe clay. At either end its course appears to be cut off by enormous ledges of barren quartz. Various amalgamating assays have been made from this soft mass of slate and plumbago, in all of which traces of gold can be found. The plumbago is from 10 to 15 per cent of the whole mass. Professor Silliman calls the formation "a highly plumbaginous slate." Many years ago the whole country thereabout was located, and it was thought a rich deposit of gold would be found there; but nothing came of it, notwithstanding a great deal of work was done on some of the claims.

**NORTH BLOOMFIELD.**—Nevada Transcript, Feb. 16: "From having till within a very short time been regarded as the liveliest town in the county, it has grown to be one of the dullest," said a citizen of North Bloomfield in speaking of that place. "How many men are working for wages in the mines there?" asked the reporter. "I cannot give you the precise number. The Malakoff has 13 men employed, and it is conscientiously trying its best to make the elevator process of mining a success. The apparatus used is liable to get out of order and cause delays. Again, but a limited amount of dirt can be handled, and a large quantity of water is required to work out a small piece of ground as compared with the hydraulic process. It has been pretty thoroughly demonstrated that only extra good dirt will pay. There are 'streaks of lean and streaks of fat' in good auriferous gravel channels, the same as in good bacon, and the channel that does not average pretty well up in the 'fat streaks' cannot be worked profitably by the elevator plan. The Mabel drift mine is worked out, the deposit of pay-gravel within its boundaries having been exhausted. Of course you know about the Derbec. The owners say they cannot make it pay with wages at \$3 a day. It is the general belief among us that the Derbec will not be worked again till the rate is down to \$2.50 a day. We fear that the latter will become the standard wages not only in North Bloomfield, but throughout the county, before many months elapse. The mine-owners at Nevada City and North Bloomfield are certainly making a fight to that end, and we are told that if it were not for the Idaho company Grass Valley district would be in the same boat." "The Last Chance drift claim at North Bloomfield is working, is it not?" asked the reporter. "Yes, to the extent that a prospecting tunnel is being driven, with a splendid outlook for making a rich development eventually. The Last Chance is a local company, and its capital is limited. But the stockholders have nerve and staying qualities. They will doubtless receive their reward in due time, but just at present their operations are not extensive enough to afford employment to many men."

**VERY SATISFACTORY.**—Grass Valley Tidings, Feb. 20: From 100 tons of ore the North Banner Mining Co. have cleaned up 84 ounces of gold. This does not include sulphurets, of which there are five tons, estimated to return \$200 per ton. From the 100 tons of quartz a small quantity of the best was picked out for smelting. Stockholders are highly pleased at the outlook, and there being "lots of it in sight," are indulging in pleasing anticipations of dividends.

**MUSCLE AND GRIT.**—Work Your Own Diggings mine is a paying property. Brockington Bros., Feeney Bros. and others are the owners and practical workers. In a little more than a year they have opened up the lead to a depth of 200 feet, built a five-stamp mill and constructed hoisting and pumping works. All this has been done by hard work. Saturday \$500 was cleaned up as the yield of 20 tons of ore, and the mill is still overcrowded with quartz of the same quality. An endeavor to secure another mill to crush the surplus is being made. The ledge averages 14 inches in thickness and gives every indication of permanency.

## Fresno.

**GOLD.**—Fresno Republican, Feb. 17: We were shown yesterday 12 or 15 chunks of bullion from the Rough and Ready mine, in the Fresno district, owned by Messrs. Knobloch & Young. The pieces of bullion will weigh about \$10 each, and a sight of them is sufficient to cure sore eyes. The Rough and Ready mine is now one of the most promising in the district, and will be developed on a large scale in the spring. All the mines of this section are improving, both in output and prospect. Some people have an idea that the wealth of this county consists entirely of the products of its rich soil, but the richness and extent of the mineral wealth of the county is just beginning to be known.

## Inyo.

**SALE.**—Inyo Register, Feb. 16: Mr. Wm. Charles completed the purchase of the Dark Horse mines on Monday last. He has taken possession of them on behalf of the Mines Co., Limited, of London. No defined plan of operation is presented yet, but the mines will no doubt be vigorously worked. The Dark Horse sale is one of the most important mining events in the history of the county. Its local influence will doubtless amount in the aggregate to a good deal. These English companies are more in the habit of getting money out of the mines than out of the stock.

## Placer.

**WIDENING.**—Placer Herald, Feb. 18: General Hamilton is busy erecting a mill on the Dardanelles mine. The channel is widening. The Gray Eagle shaft is down over 200 feet in blue gravel and washed boulders, with good indications.

**FOREST HILL.**—Placer Republican, Feb. 18: The Dardanelles, one of the richest mines on the divide, but which has not been worked much for some time,

is again coming to the front with prospects. Jo Hamilton is here making preparations to put up a stamp-mill, to be run by water-power. Mr. Johnson, formerly Deputy Sheriff of this county, is to be foreman, and Henry Maye is to be underground boss. The General has bought the little ditch leading to Todd's valley, to carry water to the mill. A mill and several buildings will be erected at the mine this spring and summer. At the May Flower, Miller and Colwell are getting out timbers for the new mill. Extensive building will be carried on at the mine as soon as the weather settles, until snow flies.

**CLEANUP.**—A cleanup was made at the Morning Star mine near Iowa Hill, last Saturday, of 74 ounces after a run of 60 hours. They are crushing about 15 tons of gravel a day.

## Sierra.

**GOLD.**—Mountain Messenger, Feb. 18: The Bull Run claim near town is finding some gold. The company has been at work only a few days.

## Shasta.

**MIDDLE CREEK.**—Cor. Courier, Feb. 18: Peter Schearer, of the Tellurium mine, is visiting S. F., and when he returns he will resume work on the Tellurium. W. E. Frickey, of the Castle Peak mine, is running a tunnel, and is now in 68 feet, and taking some good ore therefrom.

## Siskiyou.

**HYDRAULIC MINE.**—Yreka Union, Feb. 16: Hon. R. H. Campbell's hydraulic mine in Quartz valley is now lighted by electric lights, the plant having been set up and adjusted last week by E. J. Kendall, electrician and superintendent of the Western Union telegraph office in this city. This is one of the largest and richest mines in the county, and the owner has practically demonstrated that what is worth doing is worth doing well. When Mr. Campbell bonded this mine, it was predicted that only loss and disappointment awaited him, but he opened up the mine properly and made a success of the venture, the annual yield for the past 3 years varying from \$40,000 to \$60,000. Mr. Campbell is a man of nerve and rare good judgment, and his enterprise has done much toward bringing Siskiyou before the public as a mining field.

## Tuolumne.

**GOOD MINE.**—Tuolumne Independent, Feb. 18: The indications point favorably to the development of a good mine at the Ham & Birney location. We have heard that rock richer than any before taken out has been struck. This is gratifying to the owners and to the community at large, who are benefited by permanent and paying mines. The experimental mill hammers away, day and night, and the indications for a good cleanup are very favorable. Messrs. Hastings, McKenna & Engstrom took out a \$2000 pocket near Yankee Hill last week.

## NEVADA.

## Washoe District.

**OCCIDENTAL.**—Virginia Enterprise, Feb. 18: On the 200 level, in the north incline winze, 25 feet above this level, the south drift has been extended 4 feet; total, 30 feet. A north drift was advanced 4 feet. In the lower tunnel, 150 feet south of the incline winze, the south drift has been extended 6 feet; total, 18 feet. Extracted 16 tons of ore.

**WEST CON. VA. & CAL.**—Sinking the main shaft and making good progress.

**OPHIR.**—The ore found in the upraise above the 1435 level continues to look well.

**BULLION.**—Good headway is making in the work of cutting out a working station at the 500 level.

**MEXICAN.**—No. 2 crosscut on the 1300 level still continues in soft vein porphyry. In this clay, slips are of frequent occurrence.

**SIERRA NEVADA.**—Good headway is being made in the south drift on the 520 level. It is in vein material of a favorable character.

**SEGREGATED BELCHER.**—On the 1300 level the drift south from the upraise is out 135 feet. The material is vein porphyry of a fertile appearance.

**GOULD AND CURRY.**—On the 200 and 300 levels are still prospecting for ore. Have mined about 170 tons in the past week of fair-grade milling ore, which is stored in drifts, as the dump is full.

**UTAH.**—On the 472 level, in west crosscut No. 2, 400 feet north of the main west drift, the incline upraise has been carried up 45 feet. The formation is vein porphyry and quartz, showing some water.

**BENTON.**—The drifts on the 725 level are being pushed ahead as usual. The formation promises well, the ground showing indications of fertility. There has been no change worthy of note since last week.

**ALTA.**—On the 725, 825 and 1150 levels are running lateral prospecting drifts outside of the vein. The upraise on the 725 level from the Keystone vein is showing streaks and bunches of ore. The mill has not yet been started.

**YELLOW JACKET.**—The daily shipments to the river mills amount to 350 tons. The ore development near the Confidence line continues to show improvement. Since putting in a blower the air on the 1100 level has been good.

**CHOLLAR.**—Are extracting ore at several points between the 550 level and the surface. In the north drift, on the 550 level, from the Sharon shaft have developed a body of fine ore. This ore is being extracted for milling. A good deal of prospecting is being done at several points.

**CROWN POINT.**—Good headway is making in the crosscut started on the Belcher line, and also in that opposite the west crosscut. Both of these crosscuts are on the 400 level. The south drift on the 400 level is being pushed ahead as usual. It is still in vein porphyry.

**CON. CAL. & VIRGINIA.**—High-grade ore is still being stopped at the bottom of the winze below the 1435 level. The ore found in the south drift on the 1600 level is showing up well. The usual amount of ore was shipped to the river mills, and the pulp assays averaged about the same as last week.

**SAVAGE.**—On the 400 level the north drift has been advanced 45 feet and the south drift 31 feet; both are in fair-grade ore. On the 600 level the south drift has been extended 28 feet and continues in ore of excellent quality. Are extracting and shipping to the Mexican mill about 140 tons of ore per day from the several levels between the 400 and 900

stations. The improvement mentioned in last report on the 900 level continues, and both quantity and quality are improving.

**BEST AND BELCHER.**—On the 425 level the main north drift has been extended 56 feet; total length, 501. The formation is quartz and porphyry. Upraise No. 1, started at a point 130 feet north of the south line, has been carried up 15 feet; total height, 50 feet. This upraise is passing through quartz showing value by assay.

**BELCHER.**—On the 400 level the crosscut is in a distance of 50 feet, the face showing material of a favorable character. The south drift on the 500 level is out 160 feet. The material is principally quartz, clay and porphyry. There is some water coming in. Good headway is making in the drift to connect with the Suto tunnel. The ground blasts well.

**ALPHA, IMPERIAL AND EXCHEQUER.**—Work is in progress in these mines on the 122, 222 and 382 levels. No. 3 crosscut on the 122 level is out 22 feet, and the face is in low-grade quartz. On the 222 level the north lateral drift is out 485 feet from the Alpha shaft. The east side is showing quartz of a favorable appearance. On the 382 level the south drift is out 70 feet. The face is in ore, the car samples of which are from \$35 to \$50 a ton. The north lateral drift is out 50 feet and shows good quartz in the face. The east crosscut on the same level is out 57 feet. The face is in a mixture of quartz and porphyry.

**HALE AND NORCROSS.**—On the 400 level the north and south drifts have been advanced 20 feet. The south drift continues in low-grade quartz and the north drift shows stringers of good ore. On the 700 level the ore development shows further improvement. The drift north from the top of the upraise is advanced 55 feet and continues in excellent ore. Have extended this upraise two square sets higher since last report in high-grade ore. Its total length is 108 feet. The south upraise is now 77 feet above the track floor and continues in ore of good grade. Have hoisted and shipped the usual quantity of ore to the mill, and have bullion on hand amounting to \$32,000.

## Aurora District.

**TUNNEL.**—Esmeralda News, Feb. 18: The English company at Aurora are driving a tunnel to tap the Live Yankee. The tunnel is in about 300 feet. The company expect to, strike the Yankee's nose in a few days.

## Central District.

**BOOMING.**—Silver State, Feb. 17: S. W. Ruse, who is up from Central district, reports that mining operations are booming in that camp. Frank Clark started his mill Monday on ore from the Locomotive. Charley Wright and Nicky Gill are at work on the Golden Age and taking out very rich ore. The Millionaire is being worked by the Ruse Co., and they are preparing to ship their rich ore to Salt Lake City. They have a large quantity of ore that assays from \$40 to \$60 per ton, which they hope to get worked at Clark's mill.

## Eureka District.

**BULLION SHIPMENTS.**—Sentinel, Feb. 18: During the past week Wells, Fargo & Co. shipped eight bars of Eureka Co. bullion, valued at \$19,889. Also five bars of passing bullion, valued at \$9000.

## Hawthorne District.

**IMPORTANT STRIKE.**—Esmeralda News, Feb. 18: Within the last week another important strike has been made in Hawthorne district. In running a crosscut northwesterly from the 150-foot level of the Lapanta mine a four-foot vein was struck. The lessees are jubilant over the discovery, for the ore is worth \$100 per ton.

## Palmetto District.

**MILL.**—Walker Lake Bulletin, Feb. 15: R. B. Catherwood, one of the largest stockholders in the New York and Palmetto Company, came out on the C. & C. last Friday. He has a high opinion of the merits of the company's property, and will push the building of the mill to as speedy a completion as possible. This mill will be small and is being erected for the purpose of proving the value of the mines by an actual working test. This proof, which, however, is a presumption now, will result in the construction of a large mill which will be of a capacity sufficient to reduce all the ores of the district. Owing to the many tests carefully made by the company the small mill now going up is really but making assurance doubly sure, and there is no reasonable question that Palmetto will soon be one of the most active and also one of the largest bullion-producing camps in the State.

## Tuscarora District.

**PONDERE.**—Times-Review, Feb. 18: Since last report good progress has been made in east crosscut. The change in the rock would indicate a near approach to the ledge.

**BELLE ISLE.**—Working in the old stops on 250-foot level, and accumulating some good ore.

**NAVAJO QUEEN.**—As soon as the sump has attained the proper depth, will commence to crosscut for the ledge, which is known further north as the North Belle Isle west vein.

**NEVADA QUEEN.**—West crosscut has been advanced 10 feet, without change in the texture of the rock. Have finished cutting out for winze and timbered the station. The ore shows an average of about 7 feet wide, 3 feet being a better quality than any ever extracted from the mine heretofore. Just started to sink the winze.

**FOUND TREASURE.**—The dirt which had run into the crosscut connecting the old shaft with the gangway 150-foot level, has been cleaned out sufficiently for ventilation and escape purposes. Have opened the ledge, which is from 3 to 4 feet thick on this level. A drift has been started on the vein in a southeasterly direction from the crosscut, and a stop has been started northwest of the crosscut. Some high-grade ore is being hoisted to the surface.

**NAVAJO.**—South drift from west crosscut No. 2, 250-foot level, advanced 10 feet; total, 106 feet. The vein shows some high-grade ore in places.

**NORTH BELLE ISLE.**—North lateral gangway, 400-foot level, has been extended 28 feet. The formation looks favorable, and the course of the gangway has been turned more toward the vein. There is no material change to report in the workings on the 300-foot level, except that No. 3 upraise has been connected with intermediate drift, improving the ventilation and giving a better outlet for the ore,



The stopes at all points are looking well and yielding the usual amount of the different grades of ore. On the 70-foot level the crosscut west to connect with the main shaft has been extended 11 feet. Good assays are obtained from the porphyry, and it looks as if we were approaching another vein. An upraise has been started on this level near No. 1 winze. The mill has been running steadily on high-grade ore.

**GRAND PRIZE.**—The work of cleaning out and retimbering the west drift from the 200-foot level station has been started, and as soon as finished it will be driven ahead to intersect the ore body extending upward from the 300-foot level. The stopes continue to furnish the usual quantity and quality of milling ore. Everything at mine and mill running nicely. Average battery assay for the week, \$197.

**COMMONWEALTH.**—Have discontinued work in the north drift, 100-foot level, as the ore has pitched out of the drift. It continues to look as well as at any time. East drift, same level, has been extended 32 feet, exposing very fine ore along the bottom. The total distance of 48 feet looks as favorable as at any point. A west drift has been started in ore, and run 8 feet, the ore being about 3½ feet wide. Average car sample returns \$249 per ton, the first class being taken out before sampling, and stored in the mine.

## ARIZONA.

**MARTINEZ DISTRICT.**—*Arizona Journal-Miner*, Feb. 15: Through the courtesy of F. M. Murphy, the editor of this paper had an opportunity of visiting the Martinez district during the past week and taking a look at the big ledge of the now famous Congress mine. There are 15 men employed at present developing the Congress mine under the foremanship of E. D. Gillespie. The main shaft is now down to a depth of nearly 150 feet, and shows up a big, strong vein of very high-grade sulphate gold ore. Other openings are also being worked, all of which show up rich in ore with a vein varying from three to six or seven feet in width. The property is one which has not only paid expenses, but has yielded good dividends from the grass roots down, and enough high-grade ore is now being shipped to pay all expenses of development, in addition to the tons upon tons of ore running all the way from \$50 to over \$100, which is being piled up on the dumps. And this, just from sinking, running drifts, etc., there being no stopping done yet. E. D. Gillespie and James O'Hara own a claim called the Ballick, adjoining the Queen of the Hills on the east, on which they have a shaft about 35 feet deep with good showing. O'Hara and Byrne have also a claim adjoining the Cumberland or Why Not on the west called the Bellevue. John Kelly also owns a good claim called the Excelsior. All the properties in the district make a good showing wherever worked, and this camp promises to be the best in the county at an early day. While there, it was also learned from Stanton that Mr. Kerr, who went down with J. M. Vandenburg, had, after a thorough examination of the mines in that section, satisfied himself of the feasibility of erecting a mill, and would at once commence work on one. This decision had already given an impetus to mining in Weaver district, and arrangements were being made by miners to work claims which would otherwise be allowed to remain idle. Several placer claims are being worked in Skull valley and are yielding good returns. The dirt is hauled to water a distance of from two to four or five miles, and from \$6 to \$9 per load is realized.

**CLARENCE-RUBY.**—*Prescott Courier*, Feb. 16: David G. Sinclair, who has just arrived from the Clarence-Ruby gold mine and mill, on Squaw creek, east of the Agua Fria, tells us that the first mill-run was highly satisfactory to the superintendent, Mr. N. Ellis, and everybody else. Mr. Ellis took the bullion to Phoenix and a wagon-load of rich concentrations has come to Prescott for shipment. Contracts for taking out ore and furnishing timber have been let and the enterprise is, surely, David says, a success. Near it are other mines carrying gold, silver and copper, which will shortly be tested.

**THE BOGGS MINE.**—Ore is constantly coming, by wagon, to the sampler, from this great Big Bug district mine, and several Prescott gentlemen are preparing to go out and look at it. Owners of extension claims are pushing work on them and have good prospects. The ledge was recently found on the north side of the creek, in McWilliams' corral.

**HILLSIDE MINE.**—John Lawler says that this fine mine is better than ever. Ledge larger than it was near the surface. There are about nine miles of road near Camp Wood over which wagons cannot be pulled, so no ore will be shipped until the snow melts and mud dries. Mr. Lawler tells us that chances are favorable for the sale of the big copper mines of Santa Maria district. There are about 100 miners in the district and there will be a thousand there inside of a year.

**TOMESTONE.**—*Epitaph*, Feb. 18: The new concentrators of the Old Guard are nearly completed. They are the old-fashioned buddies, and are two in number. Connection was made this week on the third level of the Old Guard with the combination shaft sunk between that property and the Lucky Cuss. The air in the mine is now as pure as need be. Sinking has been resumed in the main shaft of the Lucky Cuss from a depth of 270 feet. A new level will be run at 370 and the mine systematically opened. Considerable ore has been raised in sinking and drifting, but no stopping has been done. The Lucky Cuss and East Side promise to be the coming bonanzas of the camp.

## COLORADO.

**LEADVILLE NOTES.**—*Herald-Democrat*, Feb. 16: The Flagstaff is producing some very rich ore. The Olive Branch is becoming a large producer. The Mikado is still sinking the Chadbourne shaft to greater depth. Indications in the bottom of the shaft are very favorable for striking a body of sulphide ore. The ore recently discovered in the Gilt Edge was found in the lime. It is said that a body of ore five feet thick was cut, but it was of comparatively low grade and zinky. The Big Chief is hoisting some ore from the second contact. The prospects for the Big Chief striking the continuation of the same body of ore recently opened in the Castle View are excellent. The Evening Star is not at present producing any iron ore, owing to the small demand for it. The lessees of the mine are now working

in some of the bodies of the low-grade ore, standing in the east end of the property. This ore is of very low grade in silver, but carries enough lead to be mined and sold at a profit, with the present rates for smelting. Most of the smelters are heavily stocked with argentiferous iron ore, and with the uncertain condition of the Leadville smelting industry, it is now next to impossible to sell any iron, even of the most desirable quality. A bid of 45 cents per ounce of silver was made yesterday for a contract for some of the best iron produced in Leadville, and was refused. The new Antioch stamp-mill, in White's gulch, commenced running on Monday last, and so far appears to be doing excellent work. The mill is crushing about 100 tons of ore per day. The Tiger mine, at the head of Frying Pan gulch, has not been doing so well of late as was done last year. The mine is producing only a very small amount of ore. The rich ore recently struck was found in the upper level and was in a streak but a few inches wide. It assayed, however, as high as 1000 ounces silver. The new Sharpneck diamond drill in use at the Mansfield group is proving a veritable wonder. Tuesday night it put in 10 four-foot holes while four of the miners were drilling about 30 inches apiece; or about 15 feet to one, including all delays in removing cores, etc., when compared with the old hammer and drill process. Foreman Joseph MacDonald is very enthusiastic in its praise, saying: "The drill works fine; it couldn't work better. It's immense; I wouldn't trade it for anything."

## DAKOTA.

**ALEXANDER.**—*Deadwood Pioneer*, Feb. 18: Of the many prominent properties situated in Bear Butte mining district, few present better prospects than the Alexander. On the dump of the mine there are at present something over 100 tons of ore that assays all the way from \$10 to \$200 per ton. Developments are as yet limited, confined principally to a tunnel driven into the hillsides, something over 200 feet, and wherein operations are now being pursued. A pipe varying in dimensions from ten inches to four feet and from which ore considerably higher in grade is constantly taken, furnishes strong encouragement to work vigorously. The ore will not be shipped, as the management believes it will prove of more value to the mine if kept on the dump. The ground belongs to a company, incorporated, but none of the stock has ever been offered for sale, and none is now in the market.

**FLOAT.**—The Albe shaft has now reached a depth of 75 feet, and continues in as good ore as was found when 10 feet from the surface. Drifting will commence at the 100 level, and the company then resume ore shipments to the Iron Hill smelter.

**TIN TALK.**—*Journal*, Feb. 16: A gentleman who came in from the East yesterday said that he had been shown a bill of lading for a lot of tin mining machinery, shipped to Rapid City, also some papers alleged to be contracts for construction work on the narrow-gauge road to Hill City. The report was verified last evening, when it was learned the gentleman who brought the news is Mr. J. S. Robertson, administrator of the estate of which the C. O. D. store of this city is a part. The tin machinery spoken of has been shipped from Liverpool, consigned to Rapid City. Mr. Robertson was shown the bills of lading by Ed Johnson of St. Paul, agent of the Merchants' Dispatch line. The papers alluded to as regarding a narrow-gauge road were said to be sealed bids for grading and construction.

## IDAHO.

**WOOD RIVER OUTLOOK.**—*Times*, Feb. 15: H. E. Miller, who was in town last Monday, said that he was glad that the rate of wages was fixed. For months he was importuned, both by those who wished wages reduced and those who wished them kept up, until he finally agreed to a reduction. Since then, however, he has as good as received assurances of an important reduction in the rates of freight on ore and coal, and the outlook seems favorable for the tariff on lead to remain undisturbed. Now that the outlook has improved, the mine-owners can resume work with a certain degree of confidence. The Minnie Moore is steadily increasing its force, and in a little while it will doubtless have 140 men at work on its mine and mill. The Queen of the Hills management is putting on men as fast as they can be set to work to advantage, and the Relief will employ from 12 to 15 men for the present, with the probabilities in favor of an increase at no distant period. In addition to the above, several properties in the vicinity will afford employment to a few men each—so that it is quite likely that, within 60 days, between 200 and 300 men will be employed in the mines close to Broadford and Bellevue. From other districts the news is equally favorable. The immediate vicinity of Hailey will make a good showing this year, as the Schoolboy, Climax and Commodore have a large quantity of ore in sight, and the Japan is expected to resume its place among the ore-producers. Bullion will probably be livelier than ever. The Bullion Ophir group, Mayflower, Red Elephant group, Jay Gould, Rising Sun and Idahoan will all be worked and will yield handsomely. Deer creek will doubtless step to the front rank this year. The Montana, Red Cloud, Emery or War Dance, Champion or Walla Walla, and other properties, show bonanzas of greater or lesser extent, and several prospects promise to develop into mines. On the East Fork of Wood River the North Star will doubtless soon give employment to 100 men; the Triumph group to 15 or 20, and the Pride of Idaho and other producers to 80 or 90 more. Parker gulch will probably afford employment for 100 men next summer, as the Western Reserve and Parker groups already have ore, the former yielding an average of a carload of \$400 ore weekly already. Boulder creek promises to give employment to at least 50 men this season. At Vienna, the Vienna Co. will soon begin to run a deep tunnel at least 1500 feet long. This will give new life to that entire region. The good results attained by the Tahoma Co. at Atlanta will doubtless cause a resumption of active operations in many of the old producers of that important camp. Rocky Bar and Pine Grove districts will probably give employment to all of 500 miners. Over 200 are at work there already. Smoky will do better than ever this year. The Silver Star will doubtless ship a carload per day, and Carrie Leonard half as much, while the King of the West group and the remainder of the district will doubtless equal the combined production of the Sil-

ver Star and Carrie Leonard. The Gold B-T promises much this summer; the Champlain Co. will build a mill; the Jumbo Co. have cut their ledge in depth; the Junction group is showing an extensive ore body, and the Canas No. 2 will doubtless go to strong hands. This will give value to the whole belt, Muldoon and vicinity, Era and neighborhood, and the Lost River region all promise great results this year. The general outlook for Alturas county is therefore better than ever before.

**BLISS PLACER.**—*Boise Statesman*, Feb. 17: J. S. Hunt, the placer miner from Bliss, was in town this week and reports that during the past 5 years they had not lost a day on account of cold weather. The stream from which they get their water never freezes, raises or falls, and is never muddy. The mines have been paying all the time and are as good to-day as they ever were. The product therefrom is very regular, and averages about \$10,000 a year.

**BANNER.**—*World*, Feb. 17: The Banner mill, owned and operated by the Elmira Silver Mining Co., is closed down for the present. The business of this company is carried on in such a quiet way that but little is known of their operations by any one outside the camp, except the fact that silver bars are shipped over the road during the time the mill is running. We are now informed by one who knows that the product of 1750 tons of ore milled there this season was 125 bars, weighing something over four tons of solid silver, averaging 940 fine, making the output from the mill about \$1000 per day for all the time the mill run, and their milling capacity is limited at that, being only 20 stamps and not sufficient furnace capacity to roast as much pulp as the stamps will furnish. They have paid a dividend of 20 per cent on their capital stock. This is the second dividend paid by this company, all of which has been taken out of the ground, besides the cost of improvements made on the property since this company bought it, amounting to probably \$100,000 or more, besides labor, supplies and general running expenses, showing conclusively that there's money in Boise county mines when properly worked. The superintendent, Mr. Brown, has gone East to buy a complete new outfit for sinking on the Crown Point and Wolverine ledges, both being on the same vein. The company are working 30 men this winter in the Banner and Wolverine ledges, some stoping and some prospecting, under the direction of Gerard Huppertz, foreman of the Banner, and Ben Miller, foreman of the Wolverine. These two mines are one mile apart and on different leads.

## MONTANA.

**GRANITE MOUNTAIN.**—*Butte Miner*, Feb. 16: The output of the Granite Mountain for the week ending Saturday, Feb. 14, was 36 bars, carrying 61,403.84 ounces fine silver and 22,284 ounces gold. Everything is moving smoothly and there is nothing new to report. The production of the Hecla company at Glendale for 1887 amounted to 457,712.29 ounces of silver, 401,531 ounces of gold, 132,886 pounds of copper, and 4,545,379 pounds lead.

**WILL SINK 2000 FEET.**—*Inter-Mountain*, Feb. 16: The Mountain View expects to receive its new hoisting machinery in about 10 days and within three or four weeks of its receipt will have it in position and ready to start up. The engine will be a Corliss automatic cut-off with 500-horse power capacity, one of the largest in the camp. It is the company's purpose to at once commence sinking on the completion of the new hoist and to stop for nothing until they reach a depth of 2000 feet. This will be not only the deepest shaft in the camp but also the deepest in the mountains outside of Virginia City, Nevada. The deepest workings now in Butte are only about 1150 feet—in the Lexington. It will mark an important departure in mining in Butte.

## NEW MEXICO.

**MOHAWK.**—*Rio Grande Republican*, Feb. 18: Ed Hampton and Canyon, who were working the Mohawk mine which adjoins the Modoc, found a good body of ore which assays 120 ounces in silver and 55 per cent lead. They were in town this week and took a bond on the mine for \$20,000 from the owners, J. H. Ryerson and John H. Riley.

**NEW DISCOVERY NEAR LAS CRUCES.**—Albert Fountain, Jr., and others located last week a number of claims on Elephant Hill, the little round mountain southeast of town about four miles distant. The discovery was made on the east side of the mountains, and is a contact vein between lime and porphyry showing carbonates and manganese.

**THE CRYSTAL CAVERN.**—Supt. Fitzgerald of the Bennett mine spent a week in prospecting the Crystal cavern in the Bennett mine, which he finds shows a fine body of mineral clear to the bottom. The cavern is several hundred feet long, and by shooting away the lime crystals which overlie the vein, the ore was exposed. At one place a block of ore as large as a box car stands out bodily. This means the doom of the beautiful cavern over which every visitor raves, for the ore is of greater value than the magnificent stalactites.

**THE STRIKE ON THE BENNETT.**—Another strike occurred on the Bennett mine this week. Several miners quit and the superintendent informed them that they would be paid on the 20th, which was set as payday, the miners being paid once a month. A meeting was held at Organ and a demand was made for pay every two weeks with the privilege of quitting whenever they pleased and being paid in full at the time. The superintendent refused to accede to their demand and the entire force struck. Friday they came into town and were paid off.

**THE BONITO CAMP.**—Mr. Moses Wiley, who has been sojourning in the beautiful Bonito country for the past few months, has told the *Republican* something concerning the mines of that locality. The great Parsons mine is supplying ore for two small mills, one an improved arastra and the other a Huntington centrifugal mill. Every stroke of development shows the great extent of the ore body and the owner has refused a bona fide offer of \$150,000. It is rumored that definite arrangement has been made for putting in a 100-stamp mill to work the ore this spring.

**COONEY.**—*Silver City Enterprise*, Feb. 18: Wm. Antrim of Cooney was here this week. He has a gold claim on Copper creek with a three-foot vein that so far as worked shows \$30 to the ton. A fine assay was obtained a few days ago from the rock

ground out by sinking a drill. The San Vicente Company has elected the following officers for the ensuing year: President, W. A. Wilcox; vice-president, M. P. Johnson; treasurer, F. Holtzclaw; secretary, R. L. Little. Major Frisch expects work on the Winner and possibly on the Bosworth, a west extension of the Bynner, as soon as the affairs of the company are straightened out at St. Louis.

**LAKE VALLEY.**—*Globe-Democrat*, Feb. 16: The Silver Mining Company of Lake valley is making arrangements to again open up the famous Bridal-Chamber shaft. Persons interested in mining matters will remember this mine as being the richest in the Territory. The ore consisted of almost solid silver. The mine was filled up some time ago, but later investigations have developed the fact that the deposit is not yet exhausted. Great things are yet expected from the Bridal Chamber.

**PIÑOS ALTOS.**—An *Enterprise* representative spent several days of this week in the booming camp of Pinos Altos. There are three mills running on ore and several companies working extensively, and also a number of individuals who are doing more or less work, according to their means and prospects. Altogether there are probably 150 men working in the camp, and others are being put to work as fast as developments will allow. Several houses have recently been built, and others are under way.

**COONEY CAMP.**—*Cor. Silver City Enterprise*, Feb. 10: Mr. Huston of Denver has purchased the interest of Eli Madden and M. Johnson in the Oakland mine, which is now regarded as one of the best properties ever discovered in the Magallons. The vein now shows 2½ feet of \$300 ore. M. Cooney's 5-stamp mill is nearing completion on the Silver Pink property on Silver creek. John A. Miller has started up the Peacock mine, and is piling up a large quantity of ore on the dumps. There is also a rumor in circulation that the Buick Head and Alpine mines will furnish ore to start the Sheridan mill, or in other words that the Sheridan mill will be run on custom ore, of which there is an abundance in this camp. Shelton & Penny alone have nearly 10,000 tons of ore in sight that will average \$40 to the ton.

## OREGON.

**GOOD NEWS FROM WALLOWA.**—*Bedrock Democrat*, Feb. 15: News has arrived in this city that the Wallowa Mining and Tunnel Co. has struck a rich blind ledge in the tunnel now being driven into the mountain to strike the main body of ore. The specimens received indicate that it is very rich and will assay high in silver. This is good news to the fortunate stockholders, as it indicates a larger body of ore than was anticipated, as also that the mountain contains numerous blind ledges. The men at work in the tunnel are still in the ledge, so that until they strike through it there is no knowing how large a body of ore has been struck.

## UTAH.

**ORE AND BULLION SHIPMENTS.**—*Park Record*, Feb. 18: During the week the Crescent shipped 168.275 pounds of first-class ore. For the week just ended the Mackintosh sampler received 200,980 pounds of Ontario ore; 18,970 of Daly, and 40,620 of Sampson ore; total, 260,510 pounds. On the 15th inst. (Wednesday) 8 bars of Daly bullion, 9592 fine ounces of silver, were shipped from the Marsac mill. The Ontario shipped no bullion the past week.

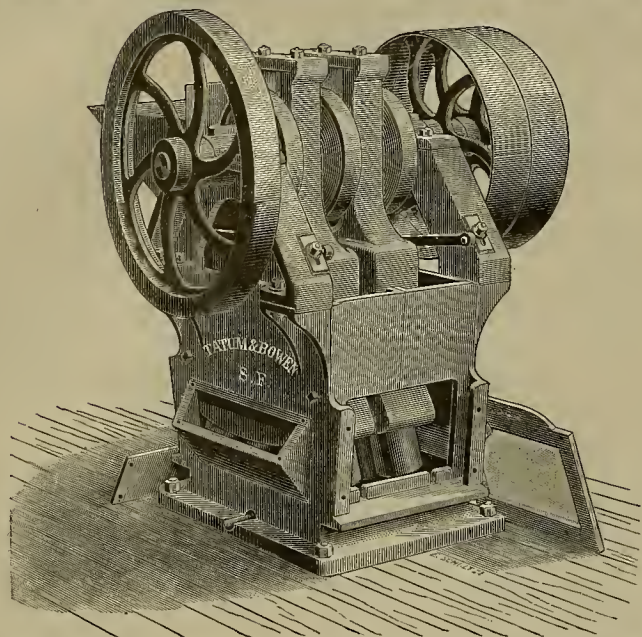
**PARK NOTES.**—*Salt Lake Tribune*, Feb. 20: Owing to the fine weather during the past week, which has cut up the roads considerably, the ore shipments have been comparatively light. The oldest inhabitant does not remember of having experienced such fine weather here during the month of February. At the Anchor tunnel the work is progressing rapidly, and it is expected that connection will be made with the intermediate shaft during the coming week. At the Crescent mine the sinking of the shaft was stopped for a few days, owing to water coming in. At the present writing the water being under control, the work is progressing as before. An extra force of men has been put to work at the Sampson, and if indications are any sign for the future, the mine will soon be a source of gratulation to its many patient and persevering stockholders.

## WASHINGTON.

**SWAUK PLACERS.**—*Cor. Ellensburg Capital*, Feb. 16: Commencing at the mouth of Becker creek, Bill Donahue and Phil Kummiskey are drifting in the old French claim on Selma Point. They are running on a bench south of the deep channel, where the Frenchmen lost their pay, and are now stoping in some very fine-looking red gravel, tight to the b-d-rock. The boys are doing good work, and expect a good cleanup in the spring. Tom Dixon is sinking in bedrock on Selma Point, to strike the seam that yielded so richly some years ago. John Back and Willie Peterson are working on the Swauk ditch, clearing out the snow and repairing breaks, while the weather permits, with the intention of taking advantage of every fine day to ground-sluice when the water is through. George Hampton, who blasted out a new ground-sluice race this winter, has already cleaned out the Williams creek ditch, which is now running full, and intends to commence piping as soon as the bank thaws out sufficient to make a stram effective. At the head of Williams creek, Bill Elliott is running a tunnel in a fine quality of blue quartz, and feels confident of striking a vein of ore. Tommy Meagher arrived a week ago with an assistant, and the trio, Tommy, Bigney and the new man, are putting in big licks laying flume. The giant and pipe are on the ground ready to be placed in position. Nelson and his nules, Gus Nelson & Bergstrom, are conspicuous at the mouth of Williams creek, where they are running a tunnel with the co-operating services of a mule and a scraper. The Chinamen are making elaborate preparations for next summer. They have turned the Swauk to the west bank, and have cleared the bed of the creek of brush and timber in a manner that looks as if they intend to clean up the whole business this season. Jake Livingston and his boys are getting everything ready in anticipation of getting started up by the 20th of this month. Mat Watson returned from Peshastan to-day, where he has been doing some assessment work. He brought out some rock with him which I learn is away up,



— THE —  
DOUBLE "ECONOMIC" STAMP MILL.



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

AN AUTOMATIC ORE FEEDER

Goes with each Mill. We also have a suitable

**Rock Breaker.**

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to supersede the old stamp in mills of the largest capacity.

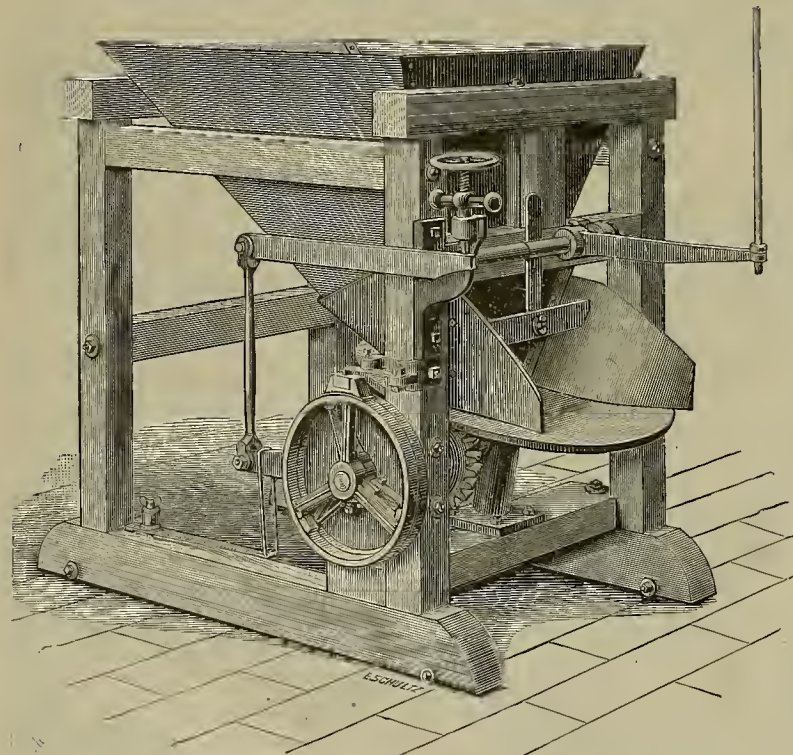
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J. R. TREGLOAN, Supt. South Spring Hill Gold Mining Co., Amador City, Cal.  
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SHIMER MATCHER HEADS.

BRAINARD MILLING MACHINES.

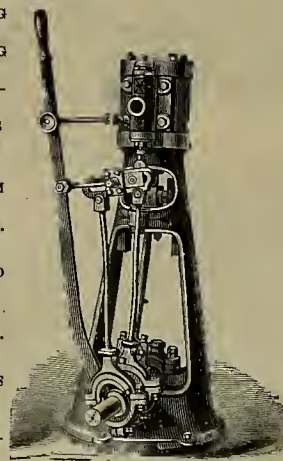
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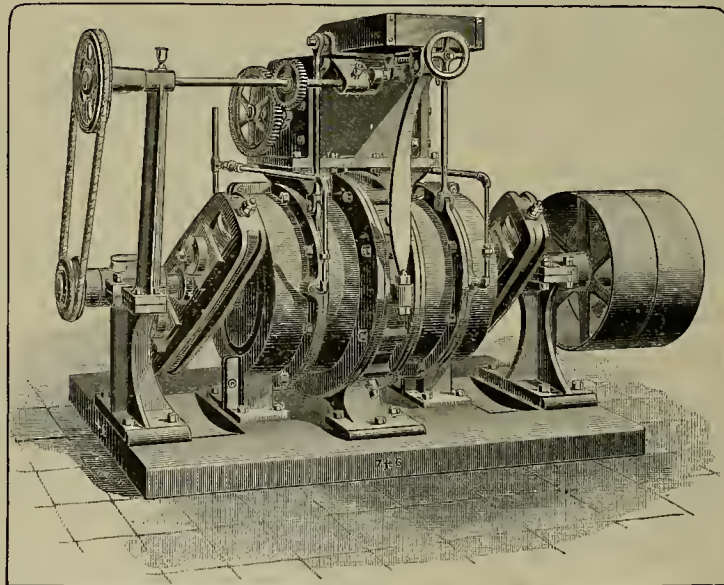
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**FRISBEE WET MILL.**

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.

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SEND FOR CATALOGUE.

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MACHINERY for SYSTEMATIC MILLING, SMELTING, and CONCENTRATION of ORES.

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## JAMES LEFFEL'S Mining Turbine Water Wheel.

These Wheels are designed for all purposes where limited quantities of water and high heads are utilized, and are guaranteed to give more power with less water than any other wheel made. Being placed on horizontal shaft, the power is transmitted direct to shafting by belts, dispensing with gearing. Estimates furnished on application for wheels specially built and adapted in capacity to suit any particular case. Further information can be obtained of this form of construction, as well as the ordinary Vertical Turbines for Wooden Penstocks and in Iron Globe Cases, free of cost, by applying to the manufacturers.

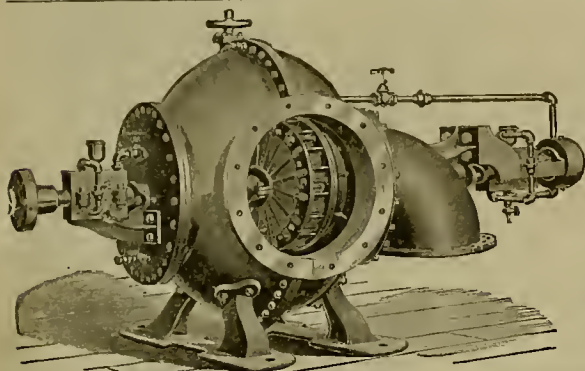
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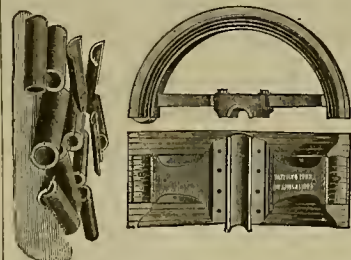
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FOR RAILROADS AND LAND CLEARING. Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

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Our Gold and Silver Tables, showing the value per ounce Troy at different degrees of fineness, and valuable tables for computation of assays in grains and grammes, will be sent free upon application. Agents for the Patent Plumbago Crucible Co., London, England. Also for E. C. DEXTER'S Silver Plated American Plates. The plates of this well-known manufacturer are thoroughly reliable, and full weight of Silver guaranteed. Orders taken at his lowest prices.

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Ores worked by any Process.

Ores Sampled.

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Working Tests (practical) Made.

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## The Copper Syndicate.

It is stated that all the copper now being bought in this country is being rapidly shipped to France. They evidently want to transfer the rule of the copper market from England to France, and have a very good show of doing so. This French syndicate is said to have about \$250,000,000 to back up their project. The famous Tharsis copper mine has agreed to sell to the copper ring all the copper it produces, at £65 per ton, and the ring undertake to refund to the company half of the profits of all they may sell at above that price. It is now stated, also, that this same syndicate has obtained the control of the output of the Calumet and Hecla copper mine, Lake Superior. The syndicate has also absorbed the Rio Tinto copper mine in Spain and the control of all the Chile bars, so that they have the copper of the world under their control. The prices paid by the syndicate are not ruling prices. The Butte mines in Montana get 11 cents for their yield for the next two years, it is understood, while the Lake Superior mines get 13 cents. The syndicate is not selling, but is shipping every ounce across the water.

The subject of this syndicate has come up in the Chamber of Deputies at Paris. It has been urged that the object is to oppose small manufacturers. The supporters of the ring contend that the result of the combination will be the transfer of the copper market from London to Paris, and claim that its formation has already increased the public fortune in France to the extent of 100,000,000 francs.

At all events, the rise in price of copper resulting from the operations of the syndicate has had the effect of starting up many mines on this coast. In this State the old Copperopolis mines are being opened. In Nevada several copper properties are being examined with a view to re-working them. In Arizona a number of mines which have been closed down have again started up. It is now stated that the United Verde copper mines, 30 miles from Prescott, have been sold to M. Clark of Butte, M. T. The property has been idle for some time owing to the excessive cost of transportation of coke and of shipping bullion. The recent rise in copper has assured its owners that both mine and mill can be run successfully. The price paid is not stated, but it is considered a handsome sum, as the former owners held it at \$3,500,000 before the rise in copper. The mining outlook for Arizona is most flattering, hardly a day passing but some sale of mining property is consummated.

A carload of machinery for a smelting furnace has arrived at Golconda, Nev., for Ronlestone & Bates, who own large copper mines about 12 miles south of that station. There is ore enough in sight to run the smelter for months.

## Mining Share Market.

Stocks continue low here and inactive as well, notwithstanding that the mining situation on the Comstock is working well. The daily shipments of Con. California and Virginia ore have been about 300 tons, and the battery assays average well. All the ore-producing sections of the mine are looking well. The usual amounts of ore have been extracted at the middle mines and at the mines in Gold Hill. In the north drift on the 550 level of the Chollar mine a rich deposit of ore has been found. This body of ore is already over 15 feet wide, and appears to be rapidly increasing in width. Portions of the deposit will assay well up in the hundreds, and all is good milling ore just as it comes from the vein. Some samples show well in native silver. The body of ore found is supposed to be the same that was found on the line on the 400 level of the Hale and Norcross. The 400 level of the Norcross corresponds to the 650 level of the Chollar.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Con. California and Virginia, Feb. 18, \$77.725; Pollock, 14, \$8000; Bluebird, 14, \$19,833; Germania, 16, \$1790; Hanauer, 16, \$2200; 17, \$4575; Germania, 17, \$3149; Hanauer, 18, \$2200; Crescent, 17, \$3725; Hanauer, 19, \$2200; Lexington, 17, \$31,824; Germania, 19, \$1642; Hanauer, 19, \$2175; Argus, 17, \$7331.

IRVING M. SCOTT, who secured for the Pacific Coast the contracts for building the iron cruisers Charleston and San Francisco, will contribute an article to the *Overland Monthly* for March, describing the difficulties encountered in raising the sunken British four-master Earl of Dalhousie from the bottom of San Francisco bay, in 1885.

## Watches as Machines.

Watches are carried for many different reasons. Some men, and most women, carry them principally for ornamental purposes, while others buy and carry them as they would buy and maintain any other machine or instrument, simply for the service they will render.

Watches are usually classed among jewelry, and a ladies' watch, with its elegant, fine gold case, studded with diamonds and other precious stones, is undoubtedly properly so classed, especially if the movement is so small (as many Swiss movements are) as to make it incapable of keeping accurate time.

But the watch of a locomotive engineer is carried by him solely because it is necessary for him to know the exact time, and not for any purpose of display.

To him it is simply a machine, or instrument, purchased and carried for a certain definite and utilitarian purpose, and to suit him every part of it should be like his engine, so constructed and so arranged as to best serve that purpose. If an engineer should find that those bearings about his engine which could be easily seen and examined were of decidedly better material and construction than those which could not be so easily seen, he would condemn the engine and lose all faith in its builder.

Locomotives are not built in that way, but we believe the majority of watches are. Instead of the total number of jewels in a watch movement being so disposed as to give the best results in point of service and wear, they are usually so arranged as to make the best appearance, and since they are usually invisible if placed in the lower plate, they are all put into the upper one.

Now, if watch movements are to be considered simply as jewelry, this is all right; but if they are to be considered as machines or instruments, constructed with a view to the performance of a certain function in the best possible manner, then it is all wrong.

If, as often happens, a wheel or pinion is nearest the lower plate, then, of course, much more wear comes upon the bearing in that plate than upon the corresponding one in the upper plate, in which case a jewel in the upper plate only is a real injury, because the wear being so much more rapid at one end than the other, the wheel rapidly gets out of square, and the inequality is in this case increased by the jewel, while it would be decreased by placing it in the lower plate.

If a maker of any other instrument of precision or any maker of machinery should turn out work constructed upon such a principle he would suffer in reputation, and would be regarded as dishonest. By what principle of ethics are the makers of watches exempt?

If jewels are set into watch cases, they are, of course, put there for ornamental purposes only, and should be so arranged as to make the best possible appearance. But if they are put into the movement, they should be so arranged as to secure the best results in wearing qualities, which is the only legitimate object in putting them there at all.—*American Machinist*.

**STANDARD CONSOLIDATED.**—At the annual meeting of the Standard Consolidated Mining Company of Bodie, held on the 20th, the following were elected directors: Joseph Tate, New York; W. H. Osoyany, New York; A. Pettibone, Bodie, Cal.; T. C. Grant, San Francisco; A. P. Brayton, San Francisco; P. N. Lillenthal, San Francisco; John Mason, San Francisco. At a meeting of the board held subsequently the following officers were elected: A. Pettibone, president; Joseph Tate, vice-president; J. W. Pew, secretary; Anglo Californian bank (Limited), treasurer; the Farmers' Loan and Trust Company of New York, transfer agents. Total receipts for the fiscal year, \$304,792.54; total disbursements, \$257,248.04. Cash on hand and in New York, \$78,341.98. Dividends were resumed during the year and \$40,000 paid. Dividend No. 72 of 10 cents, payable March 12, 1888, was declared at a meeting of the board.

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

**SILVER EXCITEMENT.**—A special from Adelaide, South Australia, of Jan. 28th, has the following: In the city a perfect silver mania has set in, and the excitement is unprecedented. A number of shopmen in town have thrown up their engagements and repaired to the field, where they have gone in for speculation. One of their number is reported to have made \$20,000 in three months, but most of them have lost everything. One mining broker cleared £19,000 last week, but should a sudden fall in stocks take place it means ruin to a large number.

**THE SWISS-WATCH INDUSTRY.**—It is stated that the importation into Europe of the Waterbury watches has done great damage to the trade in cheap Swiss watches.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

ASSESSMENTS.							
COMPANY.	LOCATIONS.	No.	AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.	
Alpha Con M Co.	Nevada.	1.	25. Jan 9.	Feb 15.	Mar 6.	C. E Elliott.	369 Montgomery St
Best & Belcher M Co.	Nevada.	39.	50. Jan 4.	Feb 9.	Mar 2.	L Oshorn.	308 Montgomery St
Baker Divide M Co.	California.	13.	25. Jan 7.	Feb 13.	Mar 22.	D M Kent.	320 Pine St
Bodie Con M Co.	California.	8.	50. Feb 12.	Mar 10.	Apr 26.	G W Sessions.	309 Montgomery St
Crown Point G & S M Co.	Nevada.	48.	50. Jan 4.	Feb 10.	Feb 29.	J Nevlands.	329 Pine St
Chollar M Co.	Nevada.	21.	50. Dec 5.	Jan 10.	Jan 31.	C E Elliott.	399 Montgomery St
Commonwealth Con M Co.	Nevada.	6.	50. Dec 28.	Feb 6.	Feb 23.	H Deas.	369 Montgomery St
Comet Con M Co.	California.	4.	30. Jan 6.	Feb 17.	Mar 14.	H Lacy.	321 California St
Champion M Co.	California.	12.	10. Feb 14.	Mar 19.	Apr 16.	T Wetzel.	322 Montgomery St
Crocker M Co.	Arizona.	5.	25. Feb 15.	Mar 27.	May 1.	A Waterman.	369 Montgomery St
Eva Con M Co.	Nevada.	21.	15. Jan 5.	Feb 10.	Mar 5.	J Stadfeld Jr.	309 Montgomery St
Exchequer M Co.	Nevada.	25.	20. Feb 7.	Mar 17.	Apr 4.	C E Elliott.	339 California St
Equitable Tunnel Co.	Utah.	32.	15. Feb 14.	Mar 30.	May 9.	C J Collins.	1018 Market St
Flowerly M Co.	Nevada.	3.	20. Jan 13.	Feb 17.	Mar 9.	I F Holden.	319 Leidesdor St
Found Treasury M Co.	Nevada.	2.	05. Jan 31.	Mar 9.	Mar 23.	J Stadfeld Jr.	419 California St
Gray Eagle M Co.	Calif. rula.	5.	14. Jan 4.	Feb 10.	Mar 3.	T We zel.	522 Montgomery St
Genesee M Co.	Nevada.	1.	05. Jan 10.	Feb 14.	Mar 6.	E F Stone.	366 Pine St
Golden Fleece G M Co.	California.	12.	70. Jan 28.	Mar 15.	Apr 10.	W J Gleason.	310 Phelan Building
Heath M Co.	Idaho.	3.	05. Feb 8.	Mar 19.	Apr 13.	W L Oliver.	323 Montgomery St
Keyes S. M Co.	Nevada.	1.	20. Feb 15.	Mar 20.	Apr 16.	H Deas.	309 Montgomery St
Live Oak Drift G M Co.	California.	8.	10. Feb 13.	Mar 20.	Apr 14.	T T Wetzel.	522 Montgomery St
Mayflower G M Co.	California.	40.	50. Jan 19.	Feb 23.	Mar 16.	J Morizio.	323 Montgomery St
Mexican G & S M Co.	Nevada.	35.	25. Jan 17.	Feb 21.	Mar 13.	C E Eliot.	309 Montgomery St
Manhattan M Co.	Nevada.	7.	1.00. Dec 9.	Jan 12.	Jan 31.	J Crockett.	327 Pine St
Monro G. M. Co.	California.	25.	50. Dec 20.	Jan 24.	Feb 28.	G W Sessions.	309 Montgomery St
North Bonanza M Co.	Nevada.	8.	15. Jan 10.	Feb 15.	Mar 14.	J J Scoville.	209 Montgomery St
Nevado M Co.	Nevada.	18.	35. Jan 10.	Feb 15.	Mar 14.	J J J Pew.	310 Pine St
Paradise Valley M Co.	Nevada.	4.	10. Jan 28.	Mar 1.	Mar 23.	W L Oliver.	328 Montgomery St
Pittsburg M Co.	California.	20.	75. Feb 14.	Mar 17.	Apr 6.	C J Baumann.	33 California St
Quartz Mt G. M. Co.	California.	20.	70. Jan 17.	Feb 20.	Mar 15.	H Beards.	217 Sansome St
Spring Valley G M Co.	California.	2.	50. Jan 11.	Feb 18.	Mar 18.	H P. Blair.	320 Sansome St
S F Copper Co.	Nevada.	2.	40. Feb 3.	Mar 19.	Apr 3.	H P. Blair.	320 Sansome St

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING DATE.
Sutro Tunnel Co.	Nevada.	P. W. Ames.	320 Sansome St.	Annual. Mar 5

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con. California & Va. M. Co.	Nevada.	A. W. Havens.	309 Montgomery St.	50.	Feb 10
Eureka Con. M. Co.	Nevada.	H. P. Hutton.	306 Pine St.	25.	Feb 3
North Bonanza M. Co.	Nevada.	J. W. Taylor.	310 Pine St.	50.	Feb 3
Russell Reduction & M. Co.	California.	J. Monzillo.	328 Montgomery St.	05.	Sept 17
San Francisco Copper M. Co.	California.	F. E. Berier.	320 Sansome St.	44.	Sept 19
Standard Con. M. Co.	California.	J. F. Pew.	310 Pine St.	05.	June 12

## San Francisco Metal Market.

WHOLESALE.	THURSDAY, Feb. 23, 1888.
ANTIMONY—French Star.	9 1/2 @ —
COPPER—	
Bolt.	26 @ 30
Sheeting.	19 @ 20
Ingot.	6 @ 18
Fire Box Sheets.	25 @ 26
IRON—Glenbrook ton.	— @ 20.00
Eglington, ton.	— @ 25.00
American Soft, No. 1.	— @ 25.00
Oregon Pig, ton.	21.00 @ 23.00
Clay Lane White.	21.50 @ 25.50
Shots, No. 1.	27.00 @ 30.00
LEAD—Pig.	5.00 @ 5.50
Sheet.	8 @ —
Shot, discount 10% on 500 bag.	Drop, 9 @ bag
Buck, 3/4 bag.	1.75 @ —
Chilled, do.	1.95 @ —
STEEL—English, do.	16 @ 25
Black Diamond, ordinary sizes.	9 1/2 @ —
Plow.	4 1/2 @ 5
Naylor & Co.	10 @ 16
TRIPLATE—Coke, No. 1.	5.75 @ 6.25
Charcoal.	6.75 @ 7.25
QUICKSILVER—By the flask.	42.00 @ —
Flasks, new.	1.05 @ —
Flasks, old.	85 @ —
BORAX—Harcourt.	7 1/2 @ 7 1/4
Powdered.	7 1/2 @ 7 1/4
Concentrated.	6 1/2 @ 7 1/4

## New York Metal Market.

Telegraphic advices dated Feb. 23d give the following New York prices:

BAR SILVER—96 1/2c per oz.

BORAX—94 1/2c.

COPPER-LAKE—\$16 75 @ —.

IRON—No. 1, \$22.00.

LEAD—\$5.00 @ 5.25.

TIN—\$36.50.

The following is the latest by mail from the "New York Metal Exchange Market Report":

COPPER—Quotations spot closing at \$16.90 @ 17.00. Transferable Notices (Lake) issued at \$16.80 @ —.

LEAD—Buo at \$4.92 1/2 @ 5.00 spot. Transferable Notices issued at \$5.00.

TIN—Quiet at \$36.85 @ 37.00. Transferable notices issued at \$36.00 @ 36.16.

MARSH'S PRICES—At tidewater. 100-ton lots of listed irons (when brand is specified) range nominally about as follows: Lehigh, Grade No. 1, \$20.50 @ 21.00; No. 2, \$19.50 @ 20.00; Grey Forge, \$17.00 @ 17.50; Hudson River, Grade No. 1, \$20.00 @ 21.00; No. 2, \$19.00 @ 20.00; Grey Forge, \$17.50 @ 19.00; Southern, Grade No. 1, \$20.00 @ 21.00; No. 2, \$18.50 @ —; Grey Forge, \$17.00 @ —.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, \$37.50 @ —.

BEST TIN, \$38.00 @ —. Baltimore Copper, \$14.75 @ 15.25; Orford Copper, \$15.50 @ 16.00; P. S. C. Copper, — @ —; Foreign Lead, \$6.40 @ 6.60; Foreign Spelter, \$6.10 @ 6.30. Antimony, \$11.50 @ 12.00.

**BOWERS' DREDGER PATENTS.**—Scrivner & Boone, attorneys for A. B. Bowers, have brought suit in the United States Circuit Court against Williams & Bixler, H. H. Lynch, the Golden State and Miners' Iron Works and Geo. E. Williams, administrator of the estate of Thomas H. Williams, deceased, for infringing six patents granted to Bowers. It is understood that suits are to be brought by the same attorney against several other parties for infringement of the same patents. Mr. Bowers was formerly a resident of this city, but now makes his headquarters at Washington. He is on a visit to San Francisco. A large company has been organized at Chicago to build dredgers under his patents.

## Our Agents.

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F. B. LOGAN—Santa Clara Co.

JOHN G. H. LAMPADIOS—Monterey Co.

JOHN W. INGALLS—Arizona Territory.

WM. WILKINSON—Stanislaus and Merced Co.'s.

A. F. JEWETT—Tulare Co.

C. E. WILLIAMS—Yuba and Sutter Co.'s.

C. G. HUSTON—Montana Territory.

**COPPER SMELTING.**—In Mr. James E. Mills' article on this subject, in the PRESS of February 4th (page 67), he is made to say that "copper mining in the United States has been developed along lines of progress quite divergent from those followed in Europe." Mr. Mills wrote: "Copper smelting in the United States," etc.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Feb. 2.	WEEK ENDING Feb. 9.	WEEK ENDING Feb. 16.	WEEK ENDING Feb. 23.
Alpha.	2.10	2.50	1.85	2.15
Alma.	2.00	2.20	2.00	2.20
Andes.	1.25	1.40	1.40	1.55
Argenta.	.25	.20	.20	.20
Belcher.	6.25	8.25	7 1/4	7 1/4
Bodie.	.50	.60	.75	.50
Bullion.	1.60	1.01	.85	1.80
Baltimore.	.85	.95	1.00	1.05
Belle Isle.	.75	.70	.75	.70
Benton.	2.30	2.40	2.30	2.15
Bodie Tunnel.	.75	.75	3.00	4.50
Bulwer.	.85	.85	1.04	.85
Con. Va. & Cal.	18 1/2	18 1/2	19 1/2	17 1/2
Challenger.	5 1/2	6.00	4.90	6.00
Champion.	6.00	6 1/2	6 1/2	6 1/2
Chollar.	2.00	2.25	2.25	2.25
Confidence.	.20	.25	.28	.27
Con. Imperial.	3.25	3.55	3.10	3.10
Con. Pacific.	.50	.60	.55	.60
Crown Point.	6 1/2	8 1/2	7 1/2	6 1/2
Crocker.	.80	.85	.80	.85
Central.	.60	.60	.60	.60
East B. & E.	.10	.11	.11	.12
Eureka Con.	1.10	1.11	1.12	1.11
Exchequer.	1.30	1.45	1.30	1.30
Grand Price.	1.40	2.05	2.15	2.00
Hale & Norcross.	9.50	10.50	10 1/2	9 1/2
Holmes.	.20	.20	.20	.20
Independence.	.30	.30	.30	.30
Iowa.	.45	.45	.45	.45
Julia.	.45	.45	.45	.45
Justice.	.95	1.10	1.00	1.05
Kentuck.	2.30	2.60	2.30	2.25
Lady Wash.	.35	.40	.40	.45
Martin White.	2.00	2.15	2.10	2.15
Mexican.	4.70	4.80	4.80	4.85
Mt. Diablo.	4.50	4.75	5.00	4.60
Northern Belle.	1.40	1.55	1.60	1.60
Nevada.	8.00	8 1/2	7 1/2	7.50
Niagara.	3.00	3.10	3.10	3.10
N. Y. Queen.	3.00	3.10	3.10	3.10
North G. & O.	1.60	1.70	1.65	1.65
Occidental.	.85	.92	.91	.92
Ophir.	1.30	2.55	2.15	2.40
Overman.	5.75	6.00	5.45	5.80
Potosi.	1.35	1.50	1.35	1.45
Peerless.	.85	.75	.75	.80
Per. Sheridan.	.05	.05	.05	.05
Silver Star.	.75	.75	.75	.75
Savage.	.75	.75	.75	.75
S. F. Belcher.	1.85	5.25	6.00	5.25
Silver Hill.	.50	.45	.45	.50
Silver King.	.75	.80	.80	.80
Scorpion.	.75	.80	.80	.80
Syndicate.	1.80	2.01	2.25	2.00
Utah.	1.80	2.01	2.25	2.00
Yellow Jacket.	.75	.95	.85	.95

## Sales at San Francisco Stock Exchange.

THURSDAY, Feb. 21, 1887.	100	Julia.	45c
600 Alta.	2	50 Justice.	95c
400 Andes.	1.30	200 Lady Wash.	40c
100 Alpha.	2.05	20 Mexican.	1.00
100 Argenta.	20c	50 Mono.	1.80
200 B. & Belcher.	5 1/2	50 Mt. Diablo.	4.50
60 Belcher.	5 1/2	50 N. Belle Is.	.75
200 Bodie.	2.45	400 Nev. Queen.	3.80
370 Baltimore.	1.50	250 Nevada.	1.60
200 Crocker.	1.60	50 Ophir.	1.05
300 Bulwer.	3.00	150 Overman.	2.95
100 Chollar.	1.50	50 Occidental.	1.50
35 Con Va & Cal.	54	620 Fotoli.	4.85
650 Challeng.	1.00	25 Nevada.	1.00
200 Crocker.	1.60	100 Peer.	50c
200 Eureka Con.	11	300 Savage.	6c
155 Exchequer.	1.10	350 Sierra Nevada.	4.70
350 Gould & Curry.	4.40	100 Syacate.	1.00
200 Grand Triv.	2.00	50 Union Con.	1.05
200 Idaho.	30c	220 Utah.	1.80
100 Iowa.	30c	400 Yellow Jacket.	3.75



## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 210 Market St., S. F.

FOR WEEK ENDING FEBRUARY 14, 1888.

R. 10,901.—GAS REGULATOR—M. J. Amick, Portland, Ogn.  
 377,801.—RUBBER HOSE—James Crompton, S.F.  
 377,743.—DEPRESSION PULLEY FOR CABLE RAILROAD—G. W. Douglas, S. F.  
 378,002.—STREET-SWEEPING MACHINE—Wm. Haas, S. F.  
 377,829.—WASHING MACHINE—N. S. Johnson, Portland, Ogn.  
 377,760.—AMALGAMATOR—W. & G. W. Johnson, Portland, Ogn.  
 378,056.—GATE—R. S. Lyon, Sonoma, Cal.  
 377,785.—DAMPER REGULATOR—Jos. St. Mary, S. F.

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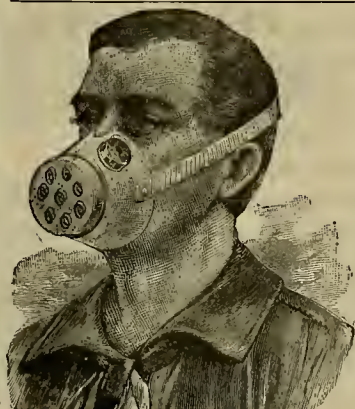
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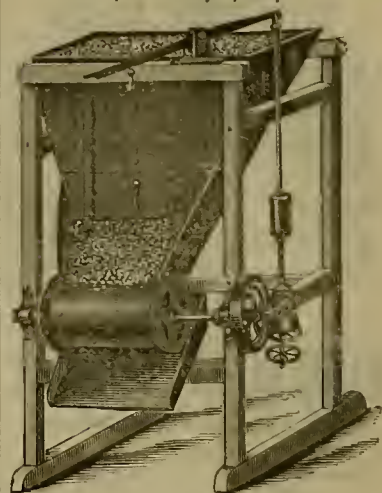
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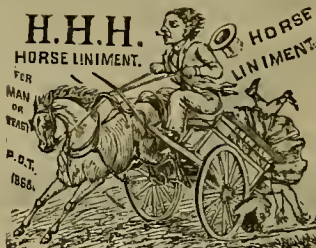
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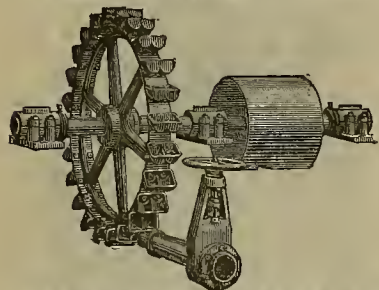
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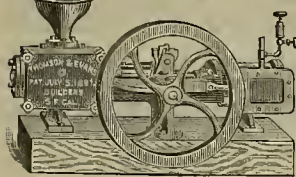
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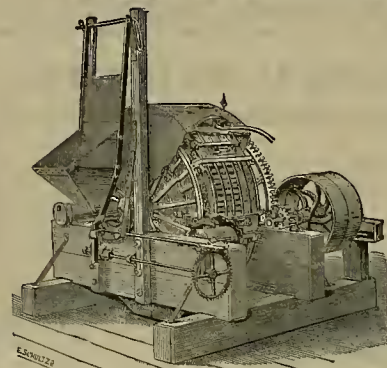
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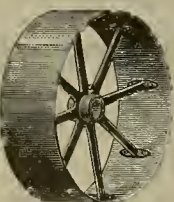
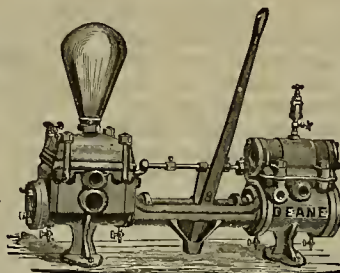
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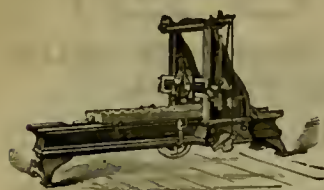
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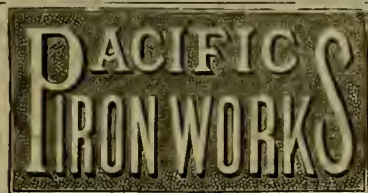


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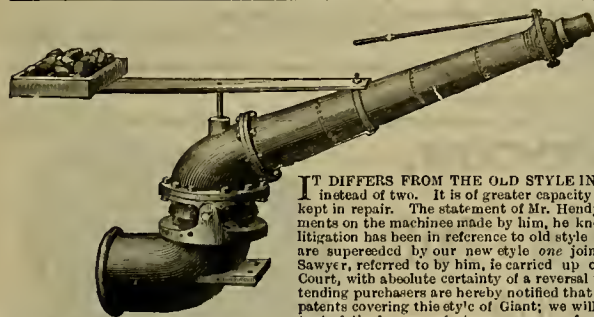
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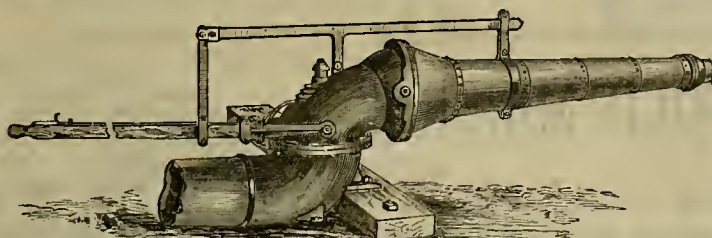
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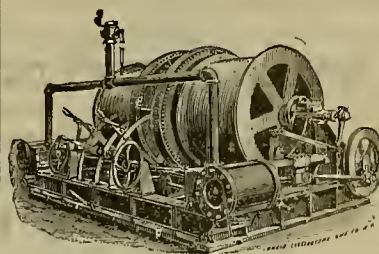
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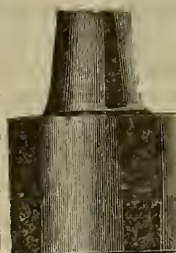
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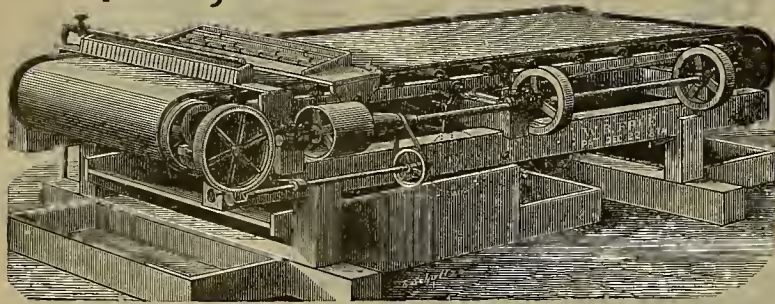
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N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

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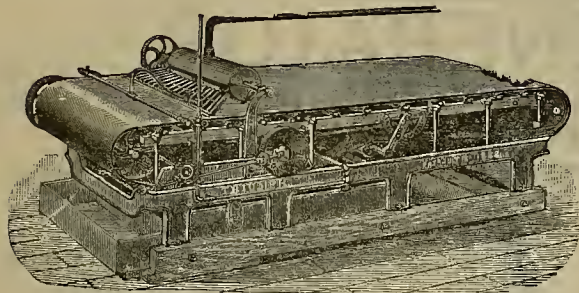
Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

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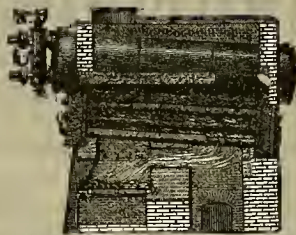
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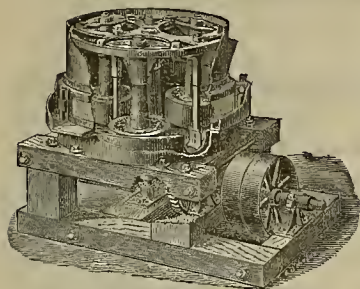
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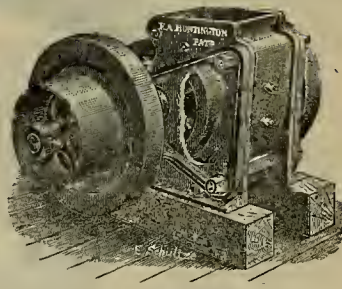
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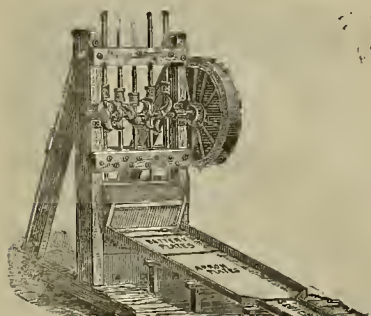
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An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MARCH 3, 1888.

VOLUME LV.  
Number 9.

## Metallurgy of Zinc.

In the world's production of zinc the United States now stands third on the list. In 1886 the production was as follows: Belgium, 129,020 tons; Silesia, 81,000 tons; United States, 38,072 tons, and Great Britain, 20,750 tons. The principal ores used in the United States are calamine and "black jack." The average per ton of these ores is from \$18 to \$20 per ton, but the silicates of zinc bring only about \$10. The furnaces principally used are those of the Belgian system; retorts 8 inches in diameter and 48 inches long.

The reported discovery of rich zinc mines in some of the United States, and the utilization of the ores, induces us to collect what facts are available respecting the metallurgy of zinc, thinking it may be both useful and interesting to our readers.

The principal ores of zinc need in distillation are calamine, or the carbonate of zinc, and blende, the sulphide of zinc, called by some of the English miners "black jack" or "brown hen." The other ores found in quantity are the red oxide and the silicic oxide.

The furnaces used in England are very similar to those used in glass factories for the fusion and preparation of glass. These furnaces are either square or round, and that represented in Fig. 1, and which is usually preferred, has the latter form. The fire-place, *F*, is raised to a convenient height above the surface of the ground, and is situated in the center of the arrangement. Around this are disposed the crucibles, *c*, into which is charged the mixture of ore and fine coke from which the zinc is to be distilled. The dome, *d*, is pierced with openings by which the mixture of powdered ore and coke is introduced, corresponding to each crucible, and the bottom of each pot is furnished with a hole in connection with an iron tube, *t*, which traverses an opening left in the side of the furnace, and thus projects beneath the floor into a chamber placed immediately below it. The upper orifice of this tube is loosely closed, previous to the introduction of the charge by a wooden plug, which, being converted into charcoal during the operation, is rendered efficiently porous to admit of the passage of the vapor of zinc, but at the same time prevents the escape of the small coal and calcined mineral.

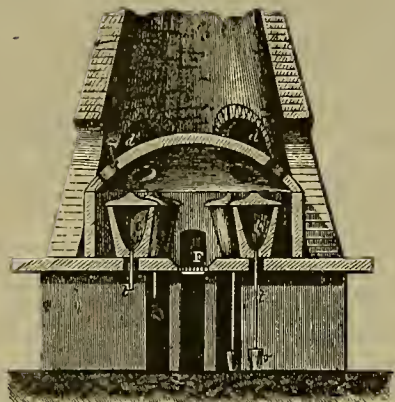
Each crucible is covered with a lid, luted with fire-clay, and the distilled metal is condensed in the tube *t*, and falls in the form of drops in the vessel *r*. As these tubes are liable to become choked by the condensed metal, a long iron rod is used to clear them occasionally to prevent explosions. The zinc collected in this operation in the form of drops and very fine powder, mixed with a certain portion of oxide, is afterward melted in a large iron pot, set in brickwork and heated by a fire beneath. The drops which collect on the surface of the fused metal is skimmed off and returned into the crucibles in a succeeding operation, the zinc being cast into ingots. Five distillations may be made in a furnace of this kind in 14 days, in the course of which 8 to 10 tons of roasted ore are treated, and from 28 to 30 tons of coal consumed. The metal obtained commonly amounts to from 35 to 40 per cent of the ore treated, and the duration of each crucible is about four months.

The preparation of zinc at the Vieille Montagne, in the neighborhood of Liege, is minutely

described by Rognaut in his "Chimie Elementaire." The ore is divided into two classes, and the mineral, after being washed, is calcined in conical kilns, similar to those employed for burning lime. The oven in which this is conducted are heated by two lateral fireplaces, covered by an arch and provided with a flue, which is divided a short distance from the hearth and enters the kiln by 20 different apertures, arranged at regular intervals. The

is placed beneath the surface of the ground, and the flame and heated air enter the interior of the furnace through four apertures, *e*. In the arch are placed two separate flues, *G, G*, which terminate in a central chimney, *C*, divided into four compartments and closed by dampers, *D*, corresponding to each division. In each of these furnaces are placed 42 cylindrical retorts, *r*, closed at one of their extremities and made of refractory clay. These are

Fig. 1.



ENGLISH ZINC FURNACE.

Fig. 2.

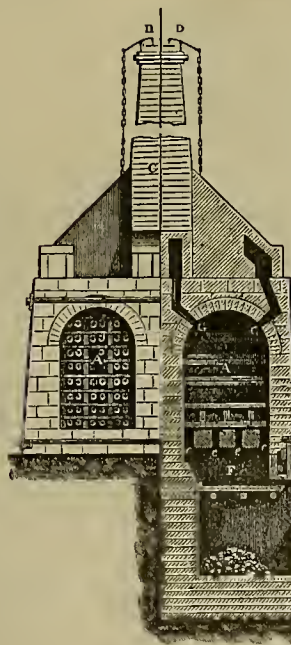


Fig. 3.



BELGIAN ZINC FURNACES.

operation is continuous, and the roasted ore, after its removal from the kiln, is ground, sifted and sent to the furnace in which its reduction is effected.

The reducing apparatus consists of four distinct furnaces united in one mass of brickwork. Each of these has the form of an arched recess, *A* (Figs. 2 and 3), whose greatest height is 8 feet 8 inches above the floor. The back of this opening is composed of a brick wall, and is slightly inclined in the direction *a, b*; the face, *c, d*, is on the contrary left, quite open for the introduction of the retorts. The fireplace, *F*,

3 feet 8 inches in length and 6 inches inside diameter. In the open end of each is introduced a conical adapter of clay, *o*, 11 inches in length, and on this, which forms the mouth of the condenser, is fitted a cone of wrought iron, *p*, of which the smaller end does not exceed an inch in diameter. The earthen retorts are placed in the furnace in eight rows raised one above the other, and with this view the back wall of the oven (Fig. 3) is furnished with as many successive steps or projections, on which are supported the closed ends of each row of tubes.

On the open face of the oven *c, d*, are arranged

eight plates of cast iron, which are fastened in their places by being fixed on the masonry, and are destined for the support of the outer end of the retorts, to which are attached the adapters. The retorts are given a regular but slight inclination downward, by which the distillation and removal of residual matters is facilitated. This furnace will run two months before relining is necessary. It takes about four days to heat it up.

When the retorts are arranged in the oven a small charge of powdered ore and charcoal is at first introduced, and these are increased for three or four days until all are working regularly. Two charges of the furnace are worked off every two hours. A detailed description of the process of distillation in this furnace is given in Phillips' Metallurgy.

## Lower Springs District.

We had a conversation this week with Mr. G. C. Frick of Lower Springs District, Shasta county. Mr. Frick is owner of the Grotefend mine, near Redding. Some of the quartz shown us from this mine looks very favorably, free gold being visible in most of it. They are down on the mine 35 feet. The Daniels company some nine years ago took out \$9000 within a hundred feet of where this ore came from. They supposed then they had worked the claim out. The quartz shown us came from the new shaft.

In this district they strike water at a depth of about 35 feet. The district being a little "pockety" is not as prosperous as its merits justify. The veins are large and run east and west. The Muchmore mine or Miller mine is the most important in the district, and the only one where systematic developments have been carried out. The greatest depth reached in the camp until Mr. Miller came was 45 feet, but he is now down 160 feet on the Muchmore. He has a 10-stamp mill which crushes ore from the mine. The ledge is a little small at the bottom of the shaft. In a winze about 100 feet west of the old workings they have got very rich ore.

The Eureka and extension of the Miller has good rock. Mr. White has the Whiteoak and Eastern Star, both of which are fine prospects. The miners are mostly poor men, and are unable to develop their properties. They need the help of capital to open their mines. The sulphurets in the rock are rich, and often good strikes of free gold are made. But capital is needed to develop the mines, purchase machinery and work the ore. The Kempton reduction works in the same district, near Redding, and on the old Shasta road, are in litigation, and land troubles have kept them back.

Most of the miners in the district are pocket-hunters and only work for surface pockets. If they had more money to go on with they would doubtless open up some very good mines.

**MECHANICS' INSTITUTE.**—There was no opposition to the regular ticket at the election of the Mechanics' Institute in this city, and the following trustees were chosen to serve two years: David Kerr, J. A. Baner, A. W. Starbird, D. A. McDonald, Geo. H. Hoppe, A. W. Scott.

**THE Montana Smelting Company** has closed a contract with the Great Falls Water-Power Company of Montana, and will erect a large smelting plant at Great Falls on the Missouri.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—E.D.S.

## San Bernardino County Mines.

[From a Correspondent.]

Since the demise of the *Calico Print* this county has not received the attention that its mining interests deserves at the hands of the average newspaper man, the boom in lands, no doubt, occupying their best energies.

During the last past year considerable profitable mining has been carried on, and probably the largest and most wonderful

## Gold Deposit

Ever discovered in the State was made in this county. Black Hawk mountain is a spur of the San Bernardino range, and is situated about 30 miles east of Victor station, on the California Southern R. R. This mountain has long been known as a mineral mountain. A large amount of prospecting has been done in former years, especially for lead and silver ores. It has remained for O. G. Leach and I. B. Cook, well known prospectors, to unearth this extraordinary gold deposit. The ledge carrying the gold ores is some two miles in length, running northerly and southerly, and dipping to the west at an angle of about 25°.

The vein is from 10 to 40 feet in width with a splendid bed or footwall of porphyry and a hanging-wall of stratified lime strongly impregnated with iron. The character of the contents of the ore ledge I cannot easily define, it being new to me; it is largely decomposed (probably one-half of the whole mass) and carries what some experts call impregnated lime spar. At any rate, the whole mass shows gold freely by panning.

This interesting ledge has some most extensive chimneys of ore. I will endeavor to give your readers an idea of its magnitude from personal inspection. There are eight locations on the main ledge—Santa Fe, Hecla, Pinon, Look-out, Senator, Black Hawk, Cliff, and Gem, nearly all having been prospected by the owners.

## The Santa Fe Claim

Is the highest location and farthest south, being about 6000 feet above the sea level. It shows a chimney of ore from 400 to 600 feet in length and 25 to 35 feet in width; this mass, as far as I sampled, should average \$8 per ton.

The Hecla, a smaller vein a couple of feet in width and about 50 feet uncovered, samples about \$50 a ton. The Pinon, with small openings, shows pannings of about \$10 per ton. I now come to the most wonderful chimney of ore I ever witnessed.

## The Lookout Mine

Has been opened by nature by an immense washout creating a canyon some 400 feet deep, cutting the ledge its full length, exposing the largest chimney of ore probably on the coast. This chimney is at least 1000 feet in length and is from 15 to 40 feet in width. Your correspondent sampled here and there for its full length, and should judge by numerous pennings that it will average from \$10 to \$15 per ton, many small veins from two inches to two feet sampling as high as \$100 per ton. The owners are now opening this ledge by terracing faces and running cuts. About the middle of the claim I sampled one of these terraced faces for 40 feet in width, and I should judge it to be a \$15 a ton prospect.

The Senator claim shows another large body some 300 feet in length and about the same width, but does not give as large pannings, probably \$6 to \$10 per ton. The Black Hawk is as yet unprospected. The Cliff claim shows some rich ore from \$40 to \$60 per ton, and the

## Gem Location,

Being the farthest north and the last location on the ledge, shows a 30 foot vein; the upper or hanging-wall for 12 feet will probably sample \$15 per ton. The lower portion of the ledge does not sample as well. C. & L. are running a tunnel on this claim, commencing on the porphyry, but as yet are not in far enough to strike the pay streak. The owners have been lucky in making their find, as it is just outside of the snow belt, and wood and water in abundance within short range.

## Calico Mining District.

Although the heavy mining suits between the Runover and Oro Grande mining companies lock up several important mines, Calico's output of bullion is quite large; all the mills (55 stamps, I believe) are pounding away, and the new 60-stamp mill of the Oro Grande Company for the working of the ore from the Waterloo mine is expected to be in full blast by the first day of April. At one time it was feared that the mines of this district would not go down, but it has been demonstrated that this was erroneous; several of the mines have been developed past the stage of uncertainty as to depth.

## Holcomb Valley Mining District.

The Valley Gold Company, an English incorporation, bought a large portion of the placer basin of this valley with a view of bed-rocking and working the gravel. They had some 20 men at work during the past summer, but only succeeded in getting the depth of 50 feet; they passed through some rich gravel at the depth of 35 feet, and are now only waiting for the snow to clear off to commence work with increased vigor and better machinery. Should they be able to reach and work the bed-

rock gravel, there is not much doubt but they will receive rich rewards. I. B. Osborne, owner of several mines and mill, commenced work late in the season, but thought it best to shut down during the severe winter months.

## Providence Mining Camp.

Kerr & Patton, who own a five-stamp mill, are running on some high-grade ore.

The old Bonanza King Company still lets its property lie idle, although their mines never showed more ore in sight than at present. They have also a large lot of rich tailings ready to be put into bullion. Whether it is the freezing out of the small fry or the depreciation of bullion that causes the continued delay in commencing operations, the writer knoweth not. Several other important properties there are also lying idle.

## Mescal Mining District.

The Cambria Mining Company of Los Angeles has a fine ten-stamp mill on its property and the mines are keeping the mill running night and day on 50 to 60-ounce ore. The rock from these mines is very hard, the mill not being able to crush over 1½ tons to the stamp in 24 hours. Several new finds of silver ore are reported in the near neighborhood. The prominence lately given to the building of the Los Angeles & Salt Lake railroad, which is intended to run through portions of Death valley, has brought into prominence the base metal mines near Soda lake. It is reported that some of the capitalists of San Francisco have bought several interests in that locality, and that they will at once commence operations. Mrs. Riggs, who owns Joe Dandy hill in that district, holds her properties at figures in the hundreds of thousands. The property is certainly very valuable, should the railroad run in its vicinity. The Joe Dandy hill is covered with rich carbonates.

San Bernardino county abounds in several other productions, iron, marble, stone quarries, borax, salt, and lime being largely operated, which will be a subject of a future letter.

Victor, San Bernardino Co.

## Preparatory Calcination of Silver-Lead Ores.

(Written for the PRESS.)

The practice of feeding raw galena ores (sometimes in the form of concentrates) into the blast furnace, even when the iron necessary to free the lead must be charged as barren flux, still survives in some parts of this country.

This method is only admissible when very pure ores are concerned and where iron in a convenient form is cheap. It should never be resorted to with ores containing other sulphurets, or combinations of arsenic, antimony and zinc.

The process of precipitation smelting, as it is termed, has been abandoned in Europe with very few exceptions in favor of preparatory roasting of ores. In other words, it has been found more economical to roast off the sulphur and other volatile ingredients before charging the ore into a blast furnace, than to precipitate the lead out by combining said sulphur with iron in the smelting process. Apart from the advantages derived from the use of cheap fuel in expelling the volatile elements, thereby reducing the work to be performed later by the more expensive coke or charcoal, the ore reaches the blast furnace in a better condition for rapid work. At the Winnamuck works in Utah, Mr. Wartenweiler found that by replacing with roasted material the hematite ore he was using as a flux, he could increase the weight of his charge by about one-third, and at the same time effect a reduction in the quantity of fuel used, approximately 28 per cent.

The troubles which invariably occur from charging "lines" into the blast furnaces may be mitigated to a great extent by slagging down the roasted material on the last hearth of the calciner, or even by bringing it into a pasty condition before withdrawing. At Tarnowitz it was found that by slagging, five or six times more "lines" could be put through the blast furnace than had been previously possible.

The dangers from accretions forming in the hearth, caused by iron being precipitated out of the charge in the metallic state, or from volatilized sulphides accumulating on the walls of the furnace above the smelting zone, are greatly diminished, and the fall of by-products, matte, speiss, etc., reduced to a minimum.

At Příbram in Bohemia, when the precipitation process was employed, the matte fall amounted to 70 per cent of the ore charged. This was reduced to 1 per cent by abandoning the process and resorting to preparatory roasting. At Winnamuck the fall was about equal to the lead bullion produced, which in case of galenas or other heavily sulphureted ores is usually in excess of 50 per cent of ore charged. Considerable expense and loss is incurred in the subsequent handling of this material.

The thorough decomposition of lead sulphide by iron requires a higher furnace temperature than that necessary for the ordinary reduction of calcined ores, therefore consumes more fuel; besides, silver follows the sulphide of lead into the matte, forming a richer product (with reference to lead contents) than the lead bullion itself. At Příbram the losses in metals were heavier when the precipitation process was in use than after preparatory roasting was substituted for it.

The silver contents of lead mattes vary con-

siderably. Some examples from the upper Hartz ran from 6 to 35 ounces per ton of 2000 pounds, others from Freiberg from 28.8 to 58.6 ounces, while at the Winnamuck works it went as high as 70 to 80 ounces.

The first of above examples was formed in the iron precipitation process, the second and third in the smelting of roasted ores; but the great difference in bulk of matte produced by the two methods of treatment amply offsets the apparent advantage which the former may possess in regard to value.

To illustrate the fallacy of treating galenas in the raw state in a blast furnace, the case of an ore carrying 55 per cent of lead in the form of sulphide may be examined. The theoretical amount of sulphur combined with the lead is 8.52 per cent of the ore.

To take up this sulphur would require .1492 per cent of the weight of the ore in metallic iron to form sulphide of iron (Fe S). In estimating the requisite amount of iron necessary to bring about this reaction it is not safe to assume that any material quantity of the sulphur will be otherwise disposed of in the reducing atmosphere of the blast furnace than in combining with iron and lime.

Usually the matte formed shows a greater relative proportion of iron to sulphur than is exhibited in the above formula, so that to insure a proper reduction of the lead, metallic iron amounting to at least 20 per cent of the weight of ore must be provided.

Assuming an iron ore to be available carrying 60 per cent metallic iron, and that it costs \$6 to pass a ton of smelting mixture through the blast furnace, for every ton of lead ore smelted one-third ton of iron flux will be required for no other purpose than to reduce out the lead. The reactions are not so complete but that considerable of the PbS escapes decomposition, which, with the surplus iron absorbed by the matte and the other matte-building constituents of the ore, combine to form a mass approximating in weight 50 per cent of the ore charged, or, in other words, one ton of matte is produced for every two tons of lead ore smelted.

This matte requires subsequently two heap roastings (often more), which consume a considerable period of time and cost approximately \$2 per ton treated. Mr. Terbune, in a paper read before the American Institute of Mining Engineers, places the cost of heap-roasting 5134 tons of matte at the Hsnauer works, in Utah, at \$2.25 per ton.

Unless the heaps are carefully picked over a number of times and the partially roasted material subjected to repeated burnings, the product is at best a mixture of partially oxidized compounds, sulphurets, etc., requiring a considerable portion of its iron contents for its own decomposition.

Assuming that coke costs \$20 per ton delivered, and that 400 pounds are used to ton of smelting mixture, we arrive at the following comparative cost of the two methods:

	By iron precipitation.	By preparatory Roasting.
Cost of calcining 1 ton ore		\$4 00
" " " " " "		6 00
" " " " " "	\$9 00	
" " " " " "	2 00	
" " " " " "		1 00
20 per cent of expenses saved by rapid smelting consequent upon preparatory roasting, etc.	0 40	
25 per cent fuel saved....	0 80	
Total cost of smelting 1 ton ore.....	\$12 20	\$10 00

There is, therefore, in the case selected for illustration a saving of 20 per cent effected in the cost of treatment by preliminary calcination over treatment in the raw state with hematite iron. Under favorable conditions this difference may become more marked, and only rarely can the reverse be demonstrated in the case of class of ore under consideration. The interest on capital tied up in the construction of proper roasting plant is offset by that used in carrying roast heaps, while in both cases the metallurgical losses are practically the same. In how far a preparatory roasting is advisable for other classes of ores is a matter for careful consideration in each individual case. A great deal depends on the proper construction of calciners, marked results being often accomplished by apparently trivial details of construction. There is no question but that ores which are often smelted in the raw state could be advantageously subjected to a preparatory calcination. Dr. G. Klupfel gives as an instance of the saving effected in fuel the case of a German iron furnace by preparatory calcination of the ore 13 per cent (Stahl und Eisen, 1883, No. 12). Percy states that the saving of fuel effected in the old Wellner furnaces at Freiberg by sintering the ores was 12.62 per cent, while 62.65 per cent more material could be put through the furnace in this form than when the ore was not sintered.

W. L. AUSTIN.

Toston, M. T., Feb. 10, 1883.

BORING for natural gas has been resumed on the land of Simon L. Jones, in the range of hills back of Searsville, San Mateo county. A contract has been made with a Mr. Bodwell, who has made successful borings on the ocean side of the same range to the depth of over 800 feet, obtaining both gas and oil at various depths. The boring will be done on Mr. Jones' place with a steam engine, a positive contract for the first 500 feet having been made, with two additional but contingent contracts for 250 feet each, if the owner so desires.

## Tuolumne County Mines.

EDITORS PRESS:—Below I give a description of some mines located three miles east of Soulsbyville. Most of them were worked in early days when only ore in soft ground was stoped out and supplies and machinery were high.

They did not go into hard rock unless the veins were very rich, and as soon as the ore in soft ground was stoped out the mines were abandoned and shafts, drifts, etc., allowed to cave in. Many mines here where the ore was low grade and would not pay in early days would now yield handsome dividends to the men who have the capital to reopen them. If any capitalists want any further information of any mines mentioned in my letters to the PRESS, I am always ready to favor them, knowing that there are many good mines in the county if there was capital invested to reopen them.

My first visit was to the North Fork mine, situated on the Buchanan mine road. It is one of the best mines lying idle in the county. The owners have not the means to open it as it should be. It is in a slate formation. The first chute of ore was worked down to water level (80 feet) in early days. It was considerable over 100 feet in length; average width of vein, 18 inches or two feet, and paying \$60 per ton. They only had a windlass to do the hoisting, machinery being at that time very expensive. They were poor managers and work was suspended. The second chute of ore, now in sight in the tunnel, runs up to three feet and goes \$13.50 to the ton.

The third chute is 18 inches and prospects splendidly; 900 feet from the last mentioned chute a shaft has been sunk. The vein at this point is 12 inches to one and one-half feet; ore yielded \$15 per ton. It can be seen by the description that it is a good property. The owners inform me that they are willing to hand and give time to prospect it before paying any cash down. All that is required is to open the first chute and erect a mill and then it will pay its hundreds per month dividend. I hope to see this mine working in full blast before many months.

My next visit was to the Tront mine. There is a vein showing from 18 inches to five feet in width. I place the ore at about \$10 per ton, and perhaps it will go more than that. There is a difficulty among the owners and they cannot agree in working it, and I understand it is for sale at a low figure. I think it would make a good property if mining men with capital would take hold of it. There is an abundance of free timber and water for mining purposes. It is supposed by some to be the extension of a mine where hundreds of thousands have been taken out.

The Rising Sun mine is still closed down. There is a fine mill and hoist on the mine which is run by water-power. Rich ore has been taken from this mine, but the chutes are very short. My opinion is in depth the chutes will lengthen and make it a paying property.

At the south of the Rising Sun is the Eaton. It is worked on a small scale by Chinese labor. The vein is small, but where it is opened at different points the ore is very good.

F. Prudhomme is working his mine and has got a very good property, but is getting down too deep for a windlass to do the hoisting, and water is a great drawback.

I am informed that one of the veins struck a short time ago in the Basin mines has widened out to six feet, with very fine ore. This mine is coming to the front, after lying idle for several years. And there is no doubt in my opinion but what it will be the best mine in the county when fully developed.

In the future workings a tunnel should be driven from the river. At least 1000 feet of "backs" can be had by working it in this way, and in the river there is an abundance of free water for milling purposes. A tunnel driven from the river would probably cut other veins known to exist on top, where some very good ore was taken out.

The Last Chance mine, which was worked in early days, is still at a standstill. It is said that a vein 18 inches to 2 feet was left in the bottom workings of the mine. There has been some extremely rich ore taken out, and it is said that the sulphurets are rich. The owner is a poor man (like many others) and has not the means to open and retimber the shafts.

The Blue Lead, Virginia and Funk mines are also idle. Good ore has been taken out of them, but in early days.

Mr. Patterson of St. Louis, and director of the Black Oak Mining and Milling Co., at Soulsbyville, has returned East, after a few weeks' visit to the mine. I understand he will return here again soon, accompanied by his family.

Soulsbyville, Feb. 21, 1883.

THE shipwright report work plenty, none of their members being idle at present. Several steam schooners are now in process of construction in the San Francisco shipyards. Frzier & Hanson are building two, White two, Boole & Beaton three and Hayes four. Hinkley, Spiere & Hayce are said to have contracts to build about a dozen more of the same class of vessels. Shipbuilding seems to be tending more and more in the direction of steam to the exclusion of sailing vessels. At the present time no sailing craft are being built at the shipyards in this port.



# Electric Pumping in Collieries.

## Comparison of Steam, Electricity and Hydraulics.

The following paper was recently read by Mr. Frank Braio before the South Wales Society of Engineers, Cardiff, and published in the *London Mining Journal*:

Before electricity is adopted by practical mining engineers, they must be convinced that it can compete economically with other modes of transmitting energy-modes, which are well known and generally applied. What percentage of indicated steam-power applied to the generating electric machine is given off, ultimately, as available energy for mechanical work? How does it compare as to cost? Under what circumstances would its application be economical? If leading main questions, such as these, can be plainly and satisfactorily answered, practical men will not be long in arriving at a favorable opinion and acting upon it. The application of electricity to underground pumping has enabled the writer to tabulate some particulars which he believes will go a long way toward satisfying inquirers that this is a method of transmitting energy capable of wide and economical adaptation. Some four years ago (Vol. 13, No. 5) Mr. W. B. Brain described to this institute in a short paper a small electric pumping plant at Atrafalgar colliery, Forest of Dean, doing the work of about 1½-horse-power. This, the writer believes, was the first attempt ever made at pumping in mines by electricity. It has continued working satisfactorily up to the present time. A similar set using about 2½-horse-power has been working in another part of the mine, some 800 yards from surface, for the past 1½ years. Both are doing excellent service, removing small quantities of water from remote parts of abandoned workings, which for the safe working of the colliery must be kept free from accumulations of water. It may be well to say the majority of the collieries in the Forest of Dean have their shafts sunk on the "rise" of the taking, and the coal is won by "dipples" or engine planes going full dip with the strata. The outcrop is riddled with old abandoned workings. These receive a great quantity of surface water, which finds its way down the slope of the strata to the deeper workings now in operation. The two electric pumps above referred to intercept some of this water on its downward course. The electrical pumping plant which the writer purposed describing in this paper has been put into deal with the main cause of water in the deep workings of the Atrafalgar colliery.

### The Pump and Motor

Are placed a distance of about 1650 yards from the bottom of the shafts, and the water has to be forced by this pump a vertical height of 300 feet to the pit bottom. This water had previous to May last been coped with by one of Hathorn Davey's water-power pumps, working in conjunction with a 7-inch double plunger Manchester Pearn pump with 10-inch steam cylinders and 14-inch stroke, the steam being obtained from the tubular boilers fixed underground. The present pump—a double 9-inch plunger with 10-inch stroke—has been specially designed by the Lilleshall Iron Company (Limited) from sketches furnished by the writer, and is fitted with spur gearing running 6 to 1. It is driven by a leather link belt running off a 5-foot 4-inch pulley, keyed on the same shaft as the spur pinion to a 14-inch pulley on motor shaft. Thus, when the motor is running at about 650 revolutions per minute the pump is making 25 revolutions. The motor supplied by Elwell-Parker (Limited) of Wolverhampton is described as one of their 12-inch machines, maximum speed about 650 revolutions per minute, output about 13,000 watts. The electric current is conveyed to it by a copper cable 2000 yards long, 19-16 wires, wrapped with compounded tape, and was supplied by the India-rubber, Gutta-Percha and Telegraph Works Company (Limited), Silvertown. This is inclosed in wooden boxes in the pit shaft only. It is supported upon earthenware insulators, placed at intervals of about 10 yards along the side of the underground roads. The return cable is an old iron-pit rope, about 4 inches in circumference, stapled to the road posts.

### The Generator

Placed on surface near the top of the shaft, is another of Elwell-Parker's 12-inch machines. Its maximum speed is about 950, and output 17,000 watts. A belt communicates the power from a 12-inch pulley on the generator to a 5 foot 11-inch pulley attached to the crank shaft of an engine. The steam engine has a single 16-inch cylinder with a 12-inch stroke and works with about 35 pounds steam pressure. It is an old marine engine, picked up some time since at an auction sale, and is not what one would purchase new for the work. It indicated running empty a loss of five horse-power, the valves and piston being both the worse for wear. In the same engine-house is another engine which supplies the power for the two small electric pumps previously referred to. The steam for both is obtained from the range of colliery boilers near. A small insulated copper wire, connected to a battery of eight No. 3 Leclanche cells connects the engine-house with the pump-house underground, and through this is registered, upon a belt in the former, each stroke of the pump. It is also used as a telephone line, so that a conversation can at any time be carried on between the engineman on surface and the man in charge of the pump un-

derground. The two smaller pumps are locked up with no one in charge, only being visited occasionally, but with this larger one some one is thought necessary, although there is rarely anything more to be done than oil the machinery, adjust the machine brushes and turn on the electricity. Near the engine the necessary electrical instruments, a voltmeter and an ammeter, are placed, by which the engineman knows the machines and cables are working properly. A magnetic out-out is also placed in the main circuit, so that should the current, through any unforeseen cause, increase, it automatically breaks the circuit, thus preventing the flow of electricity through the cables. The maximum speed at which the pump has been driven is 25 strokes (114 gallons) per minute. The observations taken at the time were:

Indicated horse-power of steam engine.....	29.49
Speed of generator.....	900
Volts (at terminals of generator).....	320
Amperes (at terminals of generator).....	43
Speed of motor.....	650
Volts (at terminals of motor).....	260
Amperes (at terminals of motor).....	43
Actual horse-power of water lifted.....	10.30

The first diagram exhibited is prepared from the above figures, and shows the total loss of power—19.13 horse-power, to be apportioned thus:

Loss in engine.....	4.40 horse-power, or 22 per cent
Loss in generator.....	4.56 " " 23 "
Loss in cables.....	3.45 " " 18 "
Loss in line.....	3.00 " " 15 "
Loss in motor.....	3.60 " " 19 "
Loss in pump.....	1.63 " " 8 "
Total.....	19.13 65

### The Actual Proportion of Power

Given off by steam used to lift water is therefore 35 per cent. A second diagram shows the percentage of useful effect extracted from the power received at each stage, together with the percentage of loss—thus, horse-power indicated by steam engine 29.49.

H. P.	Per cent.	Useful effect pr. ct
Rec'd by generator 23.00; loss in steam engine.....	22	78
Rec'd by cables....18.44; loss in generator.....	20	80
Rec'd by motor....14.90; loss in cables.....	20	80
Rec'd by pump....11.90; loss in motor.....	20	80
Rec'd by water....10.36; loss in pump.....	14	86

A third diagram shows the loss between the power given off at the belt of the steam engine, and the actual work done thus:

Horse-power given off to generator.....	23
Loss in generator.....	4.56 horse power, or 20 per cent.
Loss in cables.....	3.45 horse power, or 15
Loss in motor.....	3.60 horse power, or 15
Loss in pump.....	1.63 horse power, or 7
Total.....	19.13 65

The proportion of power given off by belt used to lift water is, therefore, 45 per cent. As to cost, this writer has been to considerable pains to verify the following figures, knowing that with business men this is the crucial test. The following is a summary of the first and of the plant:

Two electric machines.....	£310 0 0
Insulated copper lead.....	138 0 0
Return wire iron rope.....	25 0 0
Signal wire.....	10 0 0
Insulators.....	5 0 0
Steam engine (estimate).....	140 0 0
Fixing and sundries.....	15 0 0
Total.....	£614 0 0

The pump (130½) and pipes are not added to the above, seeing this item of cost would of necessity be part of any set of plant, and it would, therefore, be an item of cost common to all systems.

Detailed cost of pumping 114 gallons per minute with above machinery through 1300 yards seven-inch pipes—main rising 300 feet—one week's pumping, 22 hours per day:

Engineers (half time).....	£1 8 0
Men underground (full time).....	2 9 0
Small coal consumed—say, 36 tons, at 1s.....	1 16 0
Oil, waste, and sundries.....	0 7 0
Say 15 per cent.....	1 17 0
Total.....	£7 17 0

Cost per horse-power raised .02 of a penny. Cost per 1000 gallons of water raised 1.80 pence.

The come of water in the deep workings of the colliery has been much below the average during the past dry autumn. The pump has therefore been usually worked at about 64 gallons per minute. The results, of course, not being so good, are as follows: Proportion of power generated used to lift water 32 per cent; cost per horse-power in water raised 0.3 of a penny; cost per 1000 gallons of water raised three pence.

When opportunity offers and the hold of water is pumped out, this plant is utilized to assist in

### Maintaining the Ventilation

Some 1200 yards underground a small fan passing some 10,000 cubic feet of air per minute is placed in a return air way. A branch connection is made from the main cable to a dynamo which drives the fan by belt connection. The cost of maintaining the present plant, compared with that it has supplanted, shows an economy of about 470l. per annum. This the writer does not, however, rely upon as a fair comparison of cost, seeing the former plant had to be worked under most disadvantageous circumstances. The whole of the plant was supplied by the various makers to specification, and was put in by the colliery mechanics without any outside assistance. It commenced working without a single hitch, and has worked continuously since the end of May last with but one accident. This—strictly speaking—cannot be spoken of as an accident.

A couple of weeks ago we found much more current was being taken to do the ordinary work than usual, and on examination traced the cause to the cable in the pit shaft. Here, as already explained, the cables, which are not highly insulated, are carried in wooden troughs. The late continuous heavy rains had very much increased the feeders of water in this shaft, and this water, finding its way into the boxes, saturated the cable, causing a great escape of electricity. A lead-covered cable was substituted for the ordinary one, and the difficulty was thus completely overcome. The cable was a matter of some anxiety when the plant was being provided, as the writer feared that falls, which cannot be prevented on underground roads, would be constantly damaging it and causing delays. In practice this has never been yet found to occur. With the one line indestructible (as the iron pit rope practically is) the other, should it be damaged, can quickly and easily be repaired, or replaced with new, so that this, one of the most formidable of the anticipated difficulties, has proved quite illusory. The plan which has been adopted of supporting the cable upon earthenware insulators has proved a good one—more perfect insulation—a very important factor being obtained. The repairs necessary to the side timber of the roads, along which the cables are suspended, is also facilitated.

### The Commutators

Are the principal electrical wearing parts, and with care these will run a considerable time. In this instance, after five months' work, the wear shown is only about 1-16th of an inch, although there is an inch thickness of copper to be worn away before it is necessary to have a new one. With a spare armature kept in hand, which costs about one-third the price of a machine, no accident can happen which the colliery mechanics cannot repair, and that with little delay, everything being simple in construction and easily to be got at. It is an advantage which colliery managers will appreciate to concentrate work and have it under personal supervision. Given efficient engine power, any reasonable number of generators can be driven in one engine-house on surface, delivering power to distant places underground at various points of the compass. These dynamos would require but one man to attend to them, and the work done could, with ease, be supervised. The steam, too, can be generated at least possible cost under such circumstances, and with the work divided between two or three engines, a breakdown with either—should it occur—need not cause any delay. It is especially noticeable that this plant can be put down economically and with great dispatch. With pipes carrying steam, compressed air, or water, it is often necessary to place them in ditches specially made at considerable expense along the sides of the underground roads so as to protect them from injury, and keep them out of the way. The outlay in pipes is also great, more especially when the route is devious, and if the roads are at all given to "puck," these are constantly being broken. With electro cable none of these difficulties occur. No matter how intricate the route may be, 1000 or 2000 yards can be put to work in as many hours as it would require weeks to put in pipes. Given a pump with the necessary suction and delivery pipes fixed one mile underground, with steam-power available on surface, and it would be practicable to have that pump in work in less than a week—an impossibility with any other method. The drawing attached gives a side view of the generator in the surface engine-house, and of the motor and pump in the underground engine-house, together with a plan of the latter. Another one shows the method of suspending the cables.

A few brief extracts from papers already put,

### Comparing the Cost

Of electricity with the power derived from steam, compressed air or hydraulics, may be interesting.

The following is given by Professor Schulz (Proc. Inst. Civil Engineers, Vol. 78, page 67, and Transac. N. of Eng. Institute of Engineers, Vol. 34, page 5):

Total cost of underground haulage by locomotive:

	Per ton in pence.
Steam engine.....	1.0
Electric engine.....	1.64
Compressed air engine.....	2.06

Total cost of various systems of underground haulage:

	Per ton in pence.
Endless chain.....	0.98
Rope-and-counter-rope.....	1.29
Electric locomotives.....	1.54
Rope-and-tail-rope.....	1.89
Endless rope.....	2.83

A comparison between electric transmission and mechanical methods was published in Berlin in 1883 by A. Beringer and awarded a prize by the electro-technical society there.

A resume of it appears in the *Revue Universelle des Mines* (ser 2 tome 15 p. 522). The following brief extract may be of interest:

Comparison of cost on 10 effective horse-power hours transmitted 1093 yards: By cables, 1.77d. per effective horse-power per hour; by electricity, 2.21d.; by hydraulics, 2.90d.; by compressed air, 2.93d.

Comparison of cost on 50 effective horse-power hours transmitted same distance: By cables, 1.35d. per effective horse-power per hour; by hydraulics, 1.87d.; by electricity, 2.07d.; by compressed air, 2.27d.

Comparison of cost on 10 effective horse-

power hours transmitted 5465 yards. By electricity, 2.64d. per effective horse-power per hour; by compressed air, 4.66d.; by cables, 4.69d.; hydraulics, 5.29d.

Comparison of cost on 50 effective horse-power hours transmitted 5465 yards: By electricity, 2.37d. per effective horse-power per hour; by cables, 2.65d.; by compressed air, 2.99d.; by hydraulics, 3.02d.

Steam was the prima motor used in each instance.

From the above figures it is inferred that for distances of about 1000 yards cable transmission costs least, but that in longer distances electricity takes the lead and maintains it against all other systems. The cost per effective horse-power per hour of the electrical pumping plant herein described is found by the figures as to cost already given to be 1.18 pence. It is obvious a future is before electricity in the transmission of power. For coal-cutting it affords a ready means of distributing power; for hauling engines, which can either be stationary or run to various parts of the colliery on prepared tracks, as well as in pumping, this new motive-power must take a place, and that no despicable one, in the future of colliery working.

## The River-Mining Dredge.

The scow Dayton was recently lanchoned on the Carson river, Nevada, and is to be used for taking the tailings from the bottom of the river, so as to recover the amalgam and quicksilver contained in them. The *Lyon County Times* has the following description of the apparatus:

The boat is 80 feet long and 30 feet wide, and when loaded with sluices and machinery will draw from 10 to 12 inches of water, and was built under the immediate supervision of Mr. Don Chisholm, ship-builder of San Francisco. The estimated weight of machinery to be used is 66 tons.

There is hardly any way to estimate the amount of wealth that is contained in the river for the reason that considerable gold has gone in, in years gone by, from floods down the different canyons. About the only way to get at any figures would be to find the number of tons of rock and tailings that have been worked for the past 30 years in the different mills on the river. At least from 20 to 30 per cent of the value of this ore and tailings is there, and to this can be added from three to four pounds of quicksilver to the ton. It is safe to say, however, that at least \$350,000,000 in quicksilver and amalgam has been lost in the last 30 years.

The machinery on one dredge will raise from 400 to 500 tons of the dirt in the river-bed every ten hours. This material will pass through grizzlies and over sluices. The grizzlies will separate the coarser material from the fine, the fine passing over the sluices catching and concentrating the amalgam, quicksilver and sulphurets. From the sluices the residue will be taken up into the agitators and treated with the Rao electrical process in order to catch any material that may escape from the sluices. The lowest assay from any material in the river is \$2.50 per ton, and will run from this up to \$6 and \$7 per ton. Upon the dredge about 15 men will be employed, of whom two-thirds will be unskilled laborers; the balance will be thoroughly skilled engineers and amalgamators. The expenses for their labor, and fuel, wear and tear of machinery, etc., will be from \$60 to \$80 per day. It is calculated that from 30 to 50 per cent of what is raised will be saved; this percentage does not include the quicksilver.

As to coal in San Francisco, a local circular says: "The situation, instead of improving, is in a still more deplorable condition, as the small stock on hand, combined with light arrivals, causes a still further advance—in fact, it will lead assuredly to some of our factories closing down pro tem; even if sufficient to meet the market, the coal is unobtainable in such quantities as required. The worst feature of the situation is the assurance of its unchanged continuance for the next three or four months at least, and even then it is questionable if any marked relief can be depended upon during the rest of the year. Our northern mines, instead of verifying promises made six months ago, that their output would be materially increased this year, have seriously diminished their shipments. It is true the principal collieries have had casualties—fires, strikes, etc.—that could not be foreseen, and these are to-day the principal causes for our present coal famine. It is difficult to give reliable quotations, as cargoes near at hand and on route of foreign grades are changing hands daily, each sale showing a profit on the former transaction."

CONSTANT improvements are being made at the local glassworks. There is now made at that factory nearly every kind of glass article of the common sort known to the trade. The works run heavily upon demijohns, carboys, wine bottles, mineral water bottles, and fruit jars. Last season's demand for fruit jars was very heavy, and this year more glass will be worked up into jars than ever before.

THE Pescadero Lumber Co. has been incorporated. The purpose of this corporation is to carry on a general lumbering business. The directors for the first year are A. C. Bassett of Menlo Park, S. T. Gage of Oakland, T. E. Stillman of New York, and N. T. Smith, T. B. Bishop and J. S. Severance of San Francisco. The capital stock is \$720,000.





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W. B. EWER.

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SAN FRANCISCO

Saturday Morning, March 3, 1888.

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## Passing Events.

The explosion of the boilers of the steamer Julia at Vallejo is the first disaster of the kind we have had on the bay for many years. Most of the unfortunate victims were laboring men going to their work at the Port Costa warehouses or the Selby Lead Works. Examination of the exploded boilers shows them to have been in apparently good condition, and the cause of the explosion is unexplained.

A very rich strike in the Delhi mine, Nevada county, has been made. One piece taken out is worth about \$5000. The rich streak now being worked is 8 or 10 inches wide, right on the center of the ledge.

Some good strikes have also been made in the new camps at Salmon river, Washington Territory. It is expected that many miners will prospect in that region this summer.

At Victoria, B. C., a bill has been passed giving foreign mining companies power to incorporate under the laws of the country or State in which the members of the company reside and work minerals in British Columbia by registering there. These concessions are for the purpose of attracting foreign capital for developing mining properties.

**BOILER EXPLOSION.**—By the explosion of the boilers of the steamer Julia at Vallejo on Monday last, between 25 and 30 lives were lost, and a number of persons badly injured. It was at first thought the oil fuel had exploded, but this has been found not to be the case. The investigation as to the cause of the boilers bursting is now being made, but has not been concluded at this writing.

## Product and Uses of Silver.

From the virulence with which the use of silver as a money has been opposed by the monometalists, it would be thought that the world had been or was about to be deluged with that metal. How little reason there is or ever has been for apprehending such result, a slight examination of the facts makes readily apparent. This uneasiness, real or affected, about a dangerous increment of silver, was due to the large output of that metal which followed the discovery of the bonanza deposits on the Comstock lode, an event that occurred now some 14 or 15 years ago. Comparing the last with the first half of that period, it shows a decrease instead of an increase in the product of silver; that is to say, the seven years extending from 1831 to 1837, inclusive, yielded less silver by several million dollars than the seven years extending from 1874 to 1880, inclusive. We speak here of the Pacific Coast, which turns out more than 65 per cent of the world's product of silver. If there has occurred meantime any increment elsewhere, it has been small—not enough to make good the above deficiency.

We have then this set of facts staring us in the face: While the demand for silver has, through the rapid growth of population and business, been steadily on the increase, the quantity of that metal produced has actually been diminished. The superabundance of the white metal predicted, and perhaps feared, has not taken place. In the countries where it is most largely in use, it circulates as freely as ever. Everywhere it continues in favor with the masses; nobody distrusts nor does anybody refuse it.

If any one declines to accept it in payment of large sums, it is simply because it is bulky, and not because they fear that it will through overproduction depreciate in value. If the price of silver has of late years suffered decline and still remains low, this has been due solely to the efforts made by those interested to effect such depreciation, and which efforts, being short-sighted and selfish, opposed to the necessities of the times and the traditions of history, must ultimately fail of their purpose.

Despite the endeavors made to ostracize and dishonor it, silver is destined to keep its place as one of the moneys of mankind, performing its functions to that end co-ordinate with gold. This is inevitable. With great wars averted, as they seem likely to be, the human race devoting their energies to peaceable pursuits, there will ensue an era of unwonted industrial activity and material development. Enterprise will be stimulated and populations be multiplied at a rate heretofore unexampled. With such expansion and growth, very readily will the present output of silver, less than a hundred millions per annum, pass into the great currents of trade. Very readily will such pitiful sum find absorption among the silver-taking and silver-hoarding peoples of India and the Orient. The question of the future is apt to be where are we going to find a supply of silver adequate to the requirements of art, manufactures and commerce, rather than what shall he done with the superabundance of that metal. That the world's production will undergo some increment is probable, but that it will keep pace with the progress made in other respects can hardly be expected.

California is not largely a silver-producing country, her bullion consisting mostly of gold. Of silver she now makes less than \$3,000,000 per annum, her product having, contrary to expectation, fallen off somewhat during the past two years. But, while it might advance the interests of this State to appreciate gold at the expense of silver, there has never been shown a disposition on the part of either the people or the press of California to pursue such narrow and selfish policy. We would rather, at some cost to ourselves, see a policy come to prevail that without injuring any would bring large and lasting benefits to other sections of our common country.

The State Mining Bureau has received several mummies, which were found in Mexico, near the borders of Arizona.

The Eureka Con. furnaces and refinery have closed down for a cleanup, the first in ten months.

The Tilly mine, in the Fresno foothills, after being idle for two years, has been started up.

## Hints to Prospectors.

## The Silver Plant.

In recent numbers of the PRESS we have given extracts from Prof. R. W. Raymond's paper on "Indicative Plants," or plants which indicate the presence of certain minerals in the ground. Mr. Aug. Raht of Wickes, Montana, sent to Prof. Raymond a specimen of a plant which he said was generally regarded by experienced prospectors as an indication of silver ore in the soil on which it grows. Prof. Thos. H. Porter of Lafayette college determined and described the plant, and expressed to Prof. Raymond the opinion that the supposed relation between the plant and the metallic constituents of the soil was not improbable and was certainly worthy of investigation.

Of this plant, *Eriogonum ovalifolium*, which may, perhaps, be destined to wear the title of the silver plant, a drawing in natural size is

THE SILVER PLANT—*Eriogonum ovalifolium*.

shown on this page. It shows but one peduncle or flower-stem perfect, and two broken in transmission. But as Mr. Raht states, the specimen, when complete, was but a small part of the bunch or clump from which it was taken. One of these bunches contains sometimes as many as 25 flowers.

The genus *Eriogonum*, of the order *Polygonaceae*, is distinctly marked, and almost exclusively North American. It embraces over 100 species, two of which occur in Mexico and 97 in the United States. Of the latter, two are restricted to the South Atlantic States, and the remainder cover the region between the Mississippi and the Pacific ocean. The genus has been divided by Watson (*Proc. Am. Acad.*, vol. xii.) into three sections, and the plant now under consideration belongs to the third (*Oregonium*), being included in a sub-genus, *Heterosepala*.

It is variable and abundant in the mountains and on the foothills of the Sierra Nevada to the Rocky mountains and northward to the British boundary. The form figured is the dwarf mountain form common in the mountains of Montana and Idaho and remarkable for its small leaves, coated with a thick white fur, and its head of rose-colored flowers. It grows in low dense tufts or turf-like bunches, its bluntly pointed leaves narrowing into slender foot-stalks and its flower clusters supported by long, smooth, slender stems. Some specimens, apparently of the same variety, had yellow

flowers. Prof. Raymond says: "It will be interesting to ascertain by further inquiry whether this difference in color (which is quite within the limits of variation shown by the species) is considered significant by prospectors. Moreover, I trust the members of the Institute will use their opportunities to determine how widely the belief of the *Eriogonum* as a 'silver plant' is entertained, and what foundation there is for it. The discovery of the plant growing wild in localities where there are no silver ores would tend, of course, to disprove the belief, but its absence from argentiferous localities may prove nothing."

It is quite reasonable to believe that the presence of a minute proportion of some metallic ingredient in the soil may affect the color of a plant absorbing it. On the other hand, it is not certain, even if a plant is proved to indicate by color or other peculiarities the presence of silver, that silver is the substance actually entering into and altering the plant. The effect may be due to some other mineral substance associated with the silver ores; and our silver plant may be indicative of silver in a silver region only. A similar case is presented in prospecting for gold. As we all know, most of the signs (apart from visible particles of gold) which indicate to us a favorable "quartz," are due to the decomposition of iron pyrites or other minerals, with which the gold has been associated; and these signs have often been observed (and followed to disappointment) in localities where there was no gold at all.

Now the *Eriogonum ovalifolium* appears to have a geographical range in this country almost as great as that of the *Artemisia* or wild sage; and if that is all we can find out concerning it, it would be but a vague guide to silver mines. Everybody knows enough to look in foothills and mountains in the sage country for indications of silver ores. But if this widespread *Eriogonum* shows in the presence of silver some peculiarity, minute, perhaps, but constant, then it will vindicate its title as the silver plant. An analysis of this plant was made. In the rose-colored plants arsenic was found, but there was none detected in the plants with yellow flowers. Silver could not be found.

## Ore Reduction.

The tendency is at present to establish large reduction works at central points to which ores may be brought for beneficiation. The great reduction works at Swansea attracted ores from all over the world, and it became a great metallurgical center. By having a great variety of ores to work upon, they are so combined and treated that all the products of any value at all are extracted. By this means they are enabled to ship ores long distances and work them to better advantage than could be done where they were originally mined.

In the United States the advantages of this system are beginning to be appreciated, and a number of reduction centers have been established. Salt Lake, Omaha, Newark, Denver, Pueblo, Socorro, Kansas City, Wickes, San Francisco, and other places, obtain large quantities of ores mined at other places.

Portland, Oregon, is endeavoring to make itself a smelting center, and a number of other places are engaged in the same direction. Of course there must be good railroad or water communication with all such points. And in this connection it is becoming apparent that the railroad companies are exercising a very decided influence on the direction which the ore will take. By raising or lowering freight rates one way or the other they are enabled to turn the flow of ore to the center they favor. It is evident, however, that in order to encourage this shipment of ores some of the roads must materially lower their rates. It would seem good policy for the roads to put the freight on ore at the lowest possible point. They thus make traffic for themselves and assist materially in developing the regions through which they run.

The total yield of gold in the Cariboo district, B. C., during 1887, was \$603,258. The average rate of earnings per hand employed was \$296.

The copper mines about Luning, Nev., are creating a stir in mining circles.

CONSIDERABLE ore is being shipped to Selby's from Lodi and Downeyville, Nev.



## The Late General Master Mechanic of the S. P. R. R.

### His Many Inventions and Mechanical Designs.

In the death of Andrew J. Stevens, for many years general master mechanic of the Southern Pacific R. R., California has lost one of her most noted mechanics and inventors.

As a natural result of being so prominently identified with mechanical pursuits and having to originate or design new forms or appliances, Mr. Stevens became an inventor. He invented a number of things now in use on steamships, locomotives and in the shops, several of them of very great importance. For years past he has done his patent soliciting business with Dewey & Co.'s MINING AND SCIENTIFIC PRESS Patent Agency in San Francisco. The records of the patent office alone would scarcely show how much of a worker in inventions Mr. Stevens was, since the firm alluded to have made annually for him numbers of examinations to determine the novelty or patentability of appliances he has devised. Of course only those which proved to be original with him were patented, for he naturally, like other inventors, met many instances where he had been forestalled by others. In cases where he found that his design or device was practically covered by patent already, he pursued the idea no further, not caring for any patent which gave him only slight details or modifications of no special moment. Several of his inventions were, however, radical in their effects.

The last patent obtained by Mr. Stevens was for a balanced slide valve, No. 357,424, Feb. 8, 1887. This consisted of a valve sliding upon a valve seat and having in addition to the usual steam exhaust cavity or cavities, an auxiliary passage through it for steam supply and exhaust purposes, according to the position of the valve. In connection with this valve is a shield or balance plate and an oval balance ring fitting between the upper side of the valve and the balance plate. This valve serves the purpose of both admitting steam to the cylinder and exhausting it from the cylinder. The oval ring is very different from the circular balanced rings or packing strips, forming a square on the back of the valve. The difference is that with the circular packing it is impossible to cover the back of a valve that is twice as long as it is wide. It would take two rings to cover the back of such a valve; consequently, the expense of working and maintaining would be increased. With a square strip, there are four joints on four separate packing rings; with the oval ring, the back of any valve is covered to any desired extent with one ring, no matter what length or width. It is simple, cheap and durable. There is only one ring, one joint, and the purpose is effected with a packing-ring in one piece. While all valves balanced in the way this one is are considered to be upon the same principle, the mechanical construction of this one is radically different from anything that has been made, and takes the place of two rings where circular rings are used, and takes the place of four packing strips where they are used.

On Sept. 7, 1886, Mr. Stevens took out patent No. 348,700, on an apparatus for burning petroleum. This is the device now in use on the ferry steamers of the Southern Pacific Company. This apparatus is specially designed for burning hydro-carbons in steam-boiler furnaces. The peculiar features are in the construction of the atomizers and the arrangement for the supply of air. The exterior oil-conveying pipe is fixed on the rear end of the nozzle, which serves to close it, and combined with this is an interior steam or air-conveying pipe having an annular series of holes or openings made through it just behind and in close proximity to the nozzle, this nozzle having an enlarged chamber at the rear and a narrow slit or discharge opening at the front. Within the space which is ordinarily devoted to doors for

the introduction of coal or other fuel into a furnace, is fixed a tubular metal frame through which air is allowed to enter the lower part of the furnace and come in contact with the lower portion of the broad sheet of inflamed oil which has been injected into the furnace by the peculiar atomizers. A damper regulates the flow of air through the inlet passage. This inlet supplies a strong current of air, the oxygen of which, striking the inflamed body of oil which is injected into the furnace, produces a strong combustion as it is discharged into the partially inclosed portion of the furnace formed by the arch and bridge-wall, so that the action therein is similar to that of a retort, maintaining the body of inflamed gas and carbon at a white heat. The products of combustion passing over the top of the arch and thence into the tubes or flues through the boiler, or beneath the boiler behind the bridge-wall, according to the particular construction used.

By this construction it was possible to introduce a large body of air, and by discharging it into the furnace on a plane nearly parallel with that of the incoming sheet of inflammable gas or oil, it unites therewith, so as to produce a very perfect combustion; and the temperature of the air is raised so highly before it passes over the arch and into contact with the crown-sheet of the furnace or the tubes of the boiler that there is no danger of ill effect on account of the admission of cold air. The steam and oil are conveyed through respective pipes which lead horizontally along the front of the furnaces, having stop-valves and oil and steam regulating valves. The fine spray or vapor produced and discharged through the narrow horizontal slit of the nozzle is really atomized by Mr. Stevens' appliances by three successive and continuous operations, so that a very perfect combustion is assured.

December 6, 1885, Patent No. 331,917, for a feedwater purifier for steam boilers, was issued to Mr. Stevens. This consists of an inner shell into which water is admitted, and within which it is heated so as to rise to the top, where it passes through perforations into an exterior inclosing shell, between which and the inner one it descends, passing through holes in the bottom of the annular space into the boiler. A perforated blow-off tube extends along the bottom of the inner chamber, and through this the deposited sediment may be discharged from time to time by means of an outside cock. The impurities contained or suspended in the water are precipitated to the bottom of the chamber, from which they may be blown out.

The deflector-plate for fire-boxes was patented by Mr. Stevens November 3, 1885 (No. 329,603). The invention is an improvement in guard-plates or deflectors that are applied within steam-boiler fire-boxes behind the draft-openings, but to bring the air into more complete contact with the surface of the fuel, and to produce such intimate combination of air or gases and consequent elevation of temperature that the tubes are not exposed to direct contact of cold air from the draft openings. The deflector is fastened to a rod or shaft on the front of the furnace door so as to be moved up and down upon this point of attachment as a center. The deflector is a concave plate shaped like a scoop, and of such width as to fit in the opening in the furnace door. The deflector is so hung or balanced that it is turned down or depressed by its own weight as the door is opened and thrown back. The deflector being therefore permanently attached to the door, is automatically adjusted and brought into the required position for service inside the furnace, and is also withdrawn from the opening and turned down closely against the door out of the way of the fireman by the act of swinging back the door. As thus applied, the deflector is a fixture, and is moved into and out of action automatically by the movements of the furnace-door on its hinges.

Patent No. 305,248, September 16, 1884, relates to a novel construction of a power-lifting crane, wherein steam is employed as the lifting agent. It embraces certain constructions and combinations of lifting cylinders and connected parts for raising the load and a locking mechanism of novel character for holding the load at any point and relieving the lifting mechanism of the suspended weight. While the idea is adapted to hoisting cranes generally, the special adaptation designed by Mr. Stevens was for a powerful light and easily-operated crane, for use on railroads, to coal locomotives, load cars and other work. Its main application has been in this direction, and a number of the ma-

chines are in use on the railroads in this State. The design was one of Mr. Stevens' greatest successes. The crane is portable, and, standing on a car, can be run and used anywhere.

The valve-gear for steam engines invented by Mr. Stevens, and which is now so largely used on the locomotives of the Southern Pacific, was patented by him Nov. 6, 1883, the number of the patent being 288,133. Briefly, it consists in imparting to the valves an independent variable movement in connection or in combination with their general movements, whereby a differential instead of a regular movement and action of the valves upon their parts is obtained, the effect of which is to enable one valve to cut off at any required point and the other valve to retard the exhaust until the stroke is completed. The gist of this important invention may be stated as follows: The improvement in operating slide valves of engines, consisting in employing a separate valve-rod for each valve; in connecting each rod to a rotary disk having a movement of rotation upon its center imparted to it directly or indirectly from the engine piston, and then making connection of this disk by its center or axis with the general valve-gear or valve-actuating mechanism, whereby said valves receive independent movements from the rotation of the said disk, which movements qualify and counteract the general movements received from the valve-gear. This was Mr. Stevens' greatest invention, and, in connection with his balanced valves elsewhere referred to, makes the locomotives far superior to those with the old-fashioned link-valve gear. A marked economy in fuel results from the use of this invention.

On April 5, 1881, Patent No. 239,877 was issued to Mr. Stevens for a friction brake for steering apparatus for vessels. This is one of that class of brakes for holding the wheel or drum or steering apparatus for vessels, in which the axle or chain drum or steering gear has a band-wheel or sheave provided with a strap passing around it, the two ends being connected to a tightening mechanism. The invention was to render the tightening mechanism more effectual and practical in its operation, and also combining and arranging the brake and its operating valves or other controlling mechanism of power steering apparatus for vessels in such a manner that the brake is operated automatically by the same lever or device which stops and starts the power, and the other is thrown off as the other is brought into action, or vice versa.

His feedwater heater was patented April 12, 1871, No. 240,197. This consists in a novel device for introducing and supplying feedwater to boilers, in such a way as to keep the feedwater from contact with any part of the shell or tubes of the boiler, as it is supplied by the pumps by which incrustation is prevented, and also irregular and improper expansion and contraction of the shell and tubes. Mr. Stevens applies and combines with the boiler and within the space inclosed by the shell, but detached and separate therefrom, a reservoir into which he introduces and supplies the feedwater, and from this reservoir the water is caused to flow into the boiler and mingle with the body of water therein, as required, after its temperature is raised. This reservoir is supplied from the feed-pumps in the usual manner, and there is also provided a means for readily removing and cleaning out any sediment deposited.

Patent No. 230,079, issued July 13, 1880, was for an improved means for operating the tiller of a vessel from the reciprocations of a piston-rod of short stroke. It consists in giving to a differential drum or band a movement of rotation as well as a motion or travel in a right line from the movements of a piston in its cylinder, by which the ropes or chains from the tiller of vessel, being attached to the drum, are wound or unwound as the piston is moved and the tiller is thereby caused to travel in the required direction with an increased movement over the length of stroke of the piston. The object of this invention is to admit of a short-motor-cylinder and to produce the required sweep or movements of the tiller from a short stroke of piston without complex multiplying mechanism. The result is a steam-steering apparatus compact in form and simple and effective in operation.

The general power-steering apparatus for vessels was patented by Mr. Stevens August 24, 1880, the patent being numbered 231,505. The apparatus is for moving, holding and locking in position the rudder of a vessel during the operation of steering. It consists in an improved arrangement of a steam cylinder and multiplying mechanism for obtaining the required extent of motion of the rudder from a piston of short movement, in combination with the piston-rod or other connection through which the motor-cylinder operates upon the tiller, of one or more checking and holding cylinders having pistons which are locked or held at rest by the

action of a body of liquid confined within the cylinders. This apparatus possesses every requirement of a steering power, and is used on the large ferry steamers of this bay. It also allows the vessel to be handled with the ordinary steering apparatus when the power-cylinder cannot be supplied with steam, or when it may be injured or any one of its parts broken.

The flue and tubular boiler invented by Mr. Stevens was patented August 8, 1876, No. 180,956. It is one of the return tubular class, and consists in the employment of two chambers, situated one above the other, and at some point between the ends of the boiler, so that four flue-sheets are provided for securing the flues and tubes, which are thus made correspondingly shorter, while the elasticity of these sheets allows for the difference of expansion and contraction between the tubes and shell of the boiler much better than when the flues extend the full length, and thus reduces the danger of breaking the flues off at the point where they are secured to the sheets. The chambers give more room and time for the combustion of gases and a larger amount of heating surface, while, by connecting the upper and lower chambers by short tubes, flame is allowed to pass from the lower to the upper one so as to ignite and keep up the combustion of the gases which have passed through the back-connection and returned to this point. A greater amount of heating surface is obtained than would be the case if the chambers were dispensed with. A further advantage is found in the fact that the flues and tubes may be made in four sets, less than half the usual length, and with a correspondingly less contraction and expansion by cooling and heating. The walls of the chambers receiving the ends of the tubes in the same manner as the flue sheets, provide an elastic support at each end of each set of flues, which easily compensates for the differences of expansion and contraction which take place between the tubes and the sheet of the boiler. The inventor was thus enabled to prevent entirely the breaking of the tubes at the neck or point where they are secured to the sheet—a common difficulty where flues extend the whole length of the boiler.

In the same year, on August 22, Mr. Stevens secured Patent No. 181,370, for steam-moved valves. This was an improvement in direct-acting engines of that class in which the valves are moved by steam and independently of any exterior mechanism. The improvements consist in a novel construction and operation of valves for admitting steam to drive the main valve, which is also peculiarly constructed in detail. It would be difficult to convey a very good idea of the details of this invention without the aid of engravings.

The vacuum relief-valve for steam cylinders, invented by Mr. Stevens, was patented January 20, 1874, No. 146,617. The object of this invention is to relieve the vacuum which is produced in the cylinders of locomotive engines when the engine is running upon a down grade with the throttle-valve closed. The improvement consists in attaching a valve to the steam pipe inside the dome of the boiler, which will remain closed as long as a steam pressure is kept up in the steam pipe, but which will open when a suction or back pressure is created inside the steam pipe by the pumping action of the piston when a locomotive is running without steam so as to admit a quantity of steam at each stroke of the piston, and thus relieve the vacuum and lubricate the piston. A stem serves as an indicator to tell when the relief-valve is working properly, and also serves as a means of enabling the engineer to control the action of the valve, as he can readily open or close the ports at will by means of this stem.

Patent No. 154,529, issued August 25, 1874, covered, in a slide valve, bars and balance yoke in combination with a valve and seat. The balance yoke or follower works steam-tight against a smooth surface or seat on the inner side of the steam-chest cover, thereby protecting the back of the main valve from pressure, thus allowing the same to be worked with great ease. The bars are let into the steam-chest at either end and carry the balance yoke, holding it in between yokes steam-tight contact with its seat when it is not held by steam pressure.

The locomotive furnace was patented Dec. 23, 1873 (No. 145,819). The claim allowed by the Patent Department on this invention is "a boiler-door provided with a damper on the outside and an air-deflector on the inside, so that when the former is opened the latter deflects the whole current of air and directs it into the fuel."

Another locomotive boiler furnace was also patented Feb. 14, 1871 (No. 111,884). This covered flues with dampers in combination with deflecting plates. In combination with these it also covered a steam-jet pipe.

Patent No. 100,814, dated March 15, 1870, and ante-dated March 5th, was for a steam-

(Concluded on page 144.)



## MECHANICAL PROGRESS.

## For Every-Day Use in the Engine-Room.

The average weight of anthracite coal is 93.5 pounds per cubic foot.  
Coke (loose) weighs 23 to 32 pounds per cubic foot.

Bituminous coal weighs, per heaped bushel, loose, 75 pounds; one ton occupies 48 cubic feet.

Cast iron weighs per cubic inch, .7604 pounds; in round numbers, one-fourth of a pound to the cubic inch.

Cast iron will expand and contract between the extreme ranges of temperature in this country with a force equal to  $4\frac{1}{2}$  tons per square inch of surface exposed.

Wrought iron expands and contracts between extreme ranges of temperature equal to nine-tenths of one per square inch of section.

One gallon, U. S. standard, contains 231 cubic inches; weight of water in same, 8.331; one cubic foot contains 7.4805 gallons of water.

The velocity of steam, of atmospheric pressure, flowing into a vacuum is 1660 feet per second; into air, 650 feet per second.

To find the pressure in square inches of a column of water, multiply the height of the column in feet by 434.

The proper safe-working load for wire rope is as follows: One-half inch in diameter, 1000 pounds; five-eighths inch, 1500 pounds; three-fourths inch, 3500 pounds; one inch, 6000 pounds. This is for 19 wires to the strand, hemp centers.

To find the diameter when the circumference is known, multiply the circumference by .3183.

To find the area of a triangle, multiply the base by one-half of the height.

No. 1 wire-gage sheet iron weighs 12 $\frac{1}{2}$  pounds per square foot; No. 2 iron, 12 pounds; No. 3 iron, 11 pounds; No. 4 iron, 10 pounds; No. 5 iron, 9 pounds; No. 6 iron, 8 $\frac{1}{2}$  pounds; No. 7 iron, 7 $\frac{1}{2}$  pounds; No. 8 iron, 7 pounds.

To find the lap required on a slide valve to cut off steam at three-fourths stroke, multiply the stroke of the valve in inches by .250; the product is the lap in terms of the stroke. To cut off at two-thirds stroke, multiply by .289, lead not considered.—*Journal of Progress*.

**A NEW DEPARTURE IN BRAZING AND WELDING.**—Under this head a correspondent of *London Iron* writes to that journal as follows: The cheapening of oxygen by Brin's process of manufacture has put into the hands of metal-workers a new power. I have recently made a few experiments with the compressed oxygen and coal gas, and found that with a  $\frac{1}{2}$ -inch gas supply a joint could be brazed in a 2-inch wrought-iron pipe in about one minute, the heat being very short, the redness not extending over one inch on each side of the joint. The appearance of the surface after brazing led me to experiment further with welding, a process which is not possible with ordinary coal gas and air, owing to the formation of usnetic oxide on the surfaces. Contrary to my expectation, a good weld was obtained on an iron wire  $\frac{1}{2}$  inch in diameter, with a very small blowpipe, having an air jet about 1.32 inch in diameter. This matter requires to be taken up and tried on a larger scale for shop work as welding boiler plates, which, it appears to me, can be done perfectly with far less trouble than would be required to braze an ordinary joint. The great advantage of this would be that the boilers would require no handling, but could be welded with an ordinary large blowpipe in position, and with about one-tenth the labor at present necessary. The cost of the oxygen is trifling, and it is evident from the results obtained in brazing that the consumption of gas would be considerably less than one-fourth that necessary with an air-blast, irrespective of the fact that welding is possible with an oxygen blast, whereas it is not possible if air is used. The surface of iron heated to welding heat by this means comes out singularly clean and free from scale, and a small bottle of compressed oxygen with a blowpipe and a moderate gas supply would make the repairs of machinery, boilers, brewing coppers, and other newly apparatus a very simple matter. The trouble and difficulty of making good boiler crowns which so frequently come down would be very small indeed when the workman has an unlimited source of heat at command, under perfect and instant control.

**EMERY-WHEELS.**—In a recent paper presented to the Polytechnic Section of the American Institute, Mr. L. Duvinage divided the emery-wheels now in the market into two general classes. One class of wheels has the grains of emery joined and consolidated by a pitchy material, as rubber, linseed oil, shellac, etc. These must run at a high speed to burn out the cementing material by friction, loosening the worn grains and thus revealing new cutting angles. These are non-porous wheels. Turning up this class of wheels is done with a diamond tool. The other class consists of two kinds—one made by mixing the emery with a mineral cement and water into a paste, which will harden and bind the grains together; the other kind by mixing the emery with a mineral flux or clay, molding into shape and burning in a muffle at a high temperature. These are porous wheels, in which the grains of emery are held together by matter having affinity therefor. This class of wheels, unlike the grind-

stone, has sharp grains of emery hedged together among matter which, in some cases, is as hard and sharp as the emery itself. Such wheels cut very greedily, and do not need to be run at any particular speed. The dresser, made of hardened steel picks, is the proper tool for turning up this class of wheels.

**A NEW COUPLING FOR TRANSMITTING POWER.** A novel and ingenious means of transmitting power through a right angle has recently been devised by Mr. T. R. Almound of 83 Washington street, Brooklyn, N. Y., by whom the device is also manufactured. This coupling or quarter-turn motion, which is called "The Almound Coupling," is used for communicating power at right angles from the ordinary position without the use of noisy and expensive beveled gear, or the quarter-turn belt, over either of which it possesses decided advantage. It is so incased that the lubricant is not allowed to escape, but is held in such manner that it requires attention only at long intervals, and no dust can reach the journals or bearing surfaces. The coupling runs smoothly and noiselessly, and with very little friction. It can be held to the ceiling in any position that would be strong enough to support a hanger. The gain in the matter of power by the use of this device is of importance, as much less friction and consequent loss of power occur than with the gears of quarter-turn belt. The introduction of this device it is said has been very successful, and has elicited the warm approval of many of the leading manufacturing firms who have adopted it.

**LEAKAGE IN BOILERS.**—The *Locomotive* says that leakage at the tube ends is one of the most frequent and annoying defects to which the ordinary horizontal and upright tubular boilers are subject. It adds that the corrosion which this leakage induces speedily brings about a dangerous condition of things. This statement of affairs is undoubtedly correct; but when our contemporary argues for the pound of cure we must part company, because our preference is decidedly for the ounce of prevention. The one thing better than to be continually tinkering with boiler head and tubes is to manufacture the boiler of a material that is the least liable to corrode. Such material is refined iron, and its use insures the greatest possible immunity from corrosion and its attendant annoyances and dangers. The manufacturers of steel plates have of late been using a magnesia "physic" in their crucibles, and thereby greatly increased the tendency of their product to rust out. But they do not dare to leave the magnesia out, for then the gas cells in the ingot will be found as great flaws in the plates that come from the rolls. To grasp either horn of the dilemma seems fatal. Without magnesia, steel plates are full of flaws; with magnesia, the plates corrode. Refined iron is free from either fault.

**NEW METHOD OF MELTING IRON.**—A new method of melting iron has been devised in Germany. The cupola is supplied with blast through two tuyeres, one above the other, there being 18 in each set; the tuyeres are ports, with the form of a vertical slot, and are directly connected with a tuyere ring. The particular feature of the cupola is that the bottom is a slightly inverted arch, which is pierced by two openings, through which both blasts, or rather imperfectly consumed gases of combustion, and the fluid can flow. Below is a small chamber in which the iron collects. It is heated by the gases forced downward from the cupola above, these being supplied by the necessary air for combustion by a special tuyere leading to the main pipe, the chamber at the same time serving to preheat scrap, etc., which need only to be pushed into the bath for dissolving it. Of course, considerable quantities of scrap can be used by directly charging an ordinary cupola, but it is claimed in this case the advantages presented are economy of fuel and a greater facility for making sharp, strong castings, and a purer description of metal.

**INCREASED TENACITY NEEDED IN STEEL.**—Mr. Goodhal, an English ironmaster, read a paper at the late meeting of the Civil Engineers' Association, in which he suggested that if steel-makers could increase the thickness of ingots and improve the homogeneity of the metal, there was little doubt but that plates of much higher tenacity could be used than are at present employed. Probably in addition to the special mild steel for plates for furnaces, and the other quality, which was the same for flanging purposes and for shell-plates now in use, it might be possible for steelmakers to introduce a third quality for steel only, and by gradual steps to obtain a considerable increase of tenacity in the material. At the same time a uniform width should be specified for the samples tested, and some stipulations made as to the minimum proportion to be allowed between the breaking and permanent set.

**THE USE OF THICKER PLATES IN STEAM BOILERS.**—The growing demand for steam of higher pressure for use in steam engines is working in the direction of permitting the use of thicker fire-plates in steam boilers. It is a direct move backward. Experience has shown a hundred times that thick fire-plates were a delusion, at the best giving a feeling of security without basis. If higher steam pressure is desirable, as it no doubt is, the construction of boilers should be so changed as not to require thick fire-plates.—*American Machinist*.

## SCIENTIFIC PROGRESS.

## Emery Wheels.

At the meeting of the Polytechnic Section of the American Institute, held December 8th, L. Duvinage, in a paper, of which this is an abstract, said that the increased quantity and quality of work that goes out of the modern machine shop was due to the skillful use of solid emery wheels. He said that a grain of sand from the common grindstone magnified would look like a cobble-stone, a fracture of which shows an obtuse angle, whereas a grain of corundum or emery would look like a rhomboid, always breaking with a square or concave fracture. No matter how much it is worn down in use it does not lose its sharpness; hence it is evident that the grindstone rubs or grinds and heats the work brought in contact with it, while the corundum or emery wheel, with its sharp angular grit, cuts like a file or circular saw.

There are two general classes of emery wheels in the market—one class of wheels has the grains of emery joined and consolidated by a pitchy material, as rubber, linseed oil, shellac, etc. These must run at a high speed to burn out the cementing material by friction, loosening the worn-out grains and thus revealing new cutting angles. These are non-porous wheels. Turning up this class of wheels is done with a diamond tool.

The other class consists of two kinds, one made by mixing the emery with a mineral cement and water into a paste, which will harden and bind the grains together; the other kind by mixing the emery with a mineral flux or clay, molding into shape and burning in a muffle at a high temperature. These are porous wheels in which the grains of emery are held together by matter having affinity therefor. This class of wheels, unlike the grindstone, has sharp grains of emery hedged together among matter which, in some cases, is as hard and sharp as the emery itself. Such wheels cut very greedily, and do not need to be run at any particular speed.

The dresser, made of hardened steel picks, is the proper tool for turning up this class of wheels.

Manufacturers in metal goods aiming in reducing the cost of production would do well to look into the adaptability of the solid emery wheels or rotary file and other labor-saving machinery before deciding on reducing wages of labor.

## BROZEN FLOWERS.

According to the *New York Sun*, M. Truy, the French Consul at New York, has in his parlor the evidence of a new preservative art recently devised by a Frenchman. This evidence consists of a huge decorative piece, seemingly of roses, rosebuds, violets, smilax and other flowers and foliage, apparently carved with most exquisite delicacy in bronze. The most minute curves and veinings of the smallest petals and leaves are preserved with infinite exactitude, so that it would seem as if the piece represented years of patient application of the highest skill in this difficult branch of art. In point of fact, however, the whole thing was produced in a few hours, and at small expense, by the new process of plating, the invention of a Frenchman. Each bronze flower and leaf incloses the real original, upon which the metal has been deposited by electric action, and it is affirmed that the roses so incased retain indefinitely their perfume, and, even in their deepest interiors, their natural colors. The same process is applied in the making of silver flies, beetles and other insects, and even in the coating of lizards and small snakes for the ornamentation of parasol handles and cane-heads. The dead insect or reptile is hermetically sealed up in its metal coat, and, it is said, will never decay, at least until the metal is worn through, and, as the deposit may be put on as thick as is deemed advisable, they may be made to last as long as people's liking for them as a novelty endures. The fidelity to nature in these reproductions is wonderful.

Heretofore something has been done in the direction of plating non-conducting surfaces by giving them a primary coating of plumbago, but that always was a necessarily imperfect process. The French electrician substitutes for that a bath—the composition of which is a secret—into which the objects to be plated are plunged for a few seconds. When they are withdrawn they dry off almost immediately and seem to have upon them a faintly discernible coating like the bloom upon a plum. They are then plunged into an electric bath, and any metal desired is deposited upon them.

**IRON AND ALUMINUM.**—Iron is at present the most useful, best known, costs less, and more generally used than any of the metals. It is found everywhere, used everywhere and has the reputation of being the oldest inhabitant in many ways. Iron is subject to a variety of prices, all depending upon the labor put upon it; pig iron may be worth from \$15 to \$20 a ton, but a ton of watch-springs might trouble a capitalist to pay for them. Thus we are impressed with the fact that the value of a metal depends upon the use that can be made of it, and the labor involved in its production and preparation. At present the price of iron is

such as to keep a great many furnaces in operation, and when furnaces are kept going, do not find it necessary to "blow out for repairs." We conclude the price is satisfactory to the men who convert the ore. There is another metal, however, which is fast coming to the front, and which will answer nearly all the purposes for which iron is used, and in most cases much more satisfactorily. The only thing that keeps it in the background is the cost of producing it from its ore. But that has been reduced 200 or 300 per cent within a few years, and the work of cheapening its production is still going on. We allude to aluminum. Common clay is the ore of aluminum, and it is even more generally and abundantly diffused over the earth than are the ores of iron. We propose to speak more fully of this, as the coming metal, in our early issue.

**LACES MADE OF STEEL.**—A dealer in laces was exhibiting to an inquisitive reporter a remarkably tasteful specimen of lace of an extremely delicate pattern, and so light that it could almost be blown away by a breath of air. Had it been woven of spider webs, it could not have been much lighter. The reporter wondered what it was made of, and the dealer wanted him to guess. He said "silk;" not being correct, he guessed numerous other things and at last struck "steel." "Yes," said the dealer, "it is made of steel rolled as fine as the point of a cambric needle. It was not woven but stamped out of a sheet of low-grade steel so that it would not be too brittle. This is only an experiment," he said, "and was turned out of a small Pittsburgh mill and sent to me to show what can be done in that line. In the course of time other patterns will be made, heavier, perhaps, but certainly more tenacious than this piece. They can be used for children's underwear and hats very nicely. There is no question as to its durability, and its cheapness makes it the most salable of all laces in the market. I am looking for its perfection with great interest. It will create a small revolution in the market."—*N. Y. Mercantile Journal*.

**NATURE-SMELTED IRON.**—On the North Saskatchewan river in the Northwest Territory of Canada, about 80 miles above the town of Edmonton, Alberta, there is an interesting example of naturally reduced iron. Along the river-bank a lignite formation crops out for several miles, overlaid by clay shales and soft argillaceous sandstones containing nodules of clay ironstone. These nodules are similar to others found at Edmonton, and proved by analysis to be carbonates of iron, containing 34.98 per cent of metallic iron. The Saskatchewan seam of lignite has at some time or other been burnt, leaving a bed of ashes, clinkers and burnt clay, in places 20 feet thick, and now covered by a dense growth of grass and underwood. From this mass of burnt clay pieces of metallic iron can be picked out, weighing in some cases 15 or 20 pounds. They have evidently been reduced from the nodules above mentioned by the heat of the burning lignite. Most of the pieces of iron are much rusted, but when scratched with a file they show a bright surface. The observation is interesting, and to some may help to explain how primitive men originally discovered the reduction of iron ore.

**A NEW OIL.**—It is reported that the State Chemist of North Carolina has received a report of the discovery by a Wilmington chemist, W. A. Martin, of a new oil and a process for obtaining it. The double discovery is thought to be quite valuable, and promises to be an acquisition to the industries of the country. The oil is a hydrocarbon, and vegetable in its nature. It can be obtained from any source not mineral or animal—as from wood or other vegetable matter. It is pure oil, colorless, and has a very faint and hardly perceptible odor, not at all disagreeable. It is perfectly neutral, will not ferment or become rancid, and remains perfectly limpid in cold weather. As an illuminant it gives a strong, brilliant light, and is non-explosive. It makes a splendid lubricant for machinery of all kinds, and in every respect it is superior to lard oil, and is a great deal cheaper.

**POWDERED COAL FOR FUEL.**—A press telegram from Chester, Pa., Jan. 24th, says: At the Chester Iron Works for the last few days, there has been successfully tested the application of powdered coal for fuel. The combustion is perfect. Both ashes and smoke are entirely consumed, effecting a saving of from 40 to 50 per cent in fuel. The coal is powdered by the cyclone principle and applied to the furnaces by a process invented by J. G. McCauley.

**HOW MANY FORMS CAN MATTER TAKE?**—All matter can be resolved into four aggregate forms—solid, liquid, gaseous and imponderable. There are no sharp lines of distinction between these four forms; that is, a body may be in a semi-fluid state, like glaciers which flow in a solid state, and many soft substances are neither solid nor liquid; they may be called plastic.

**PHYSICAL EXERTION.**—A physician lecturing upon physical exercise declared that if only 20 minutes a day were spent in that manner as an adjunct to mental education we might live to be 70 without a day's illness and perhaps prolong our lives to 200 years.



## USEFUL INFORMATION.

## The Best Possible Method of Plastering Walls.

We give below a very interesting and instructive paper, recently read before the S. F. Chapter of the American Institute of Architects by J. P. McMurray of this city, a well-known manufacturer of plaster decorations. The paper forms a complete monograph of the philosophy and art of making and using plaster. We copy from the *California Architect*:

Before we consider the best method of making and applying mortar to walls, let us examine the nature and properties of the materials used and their chemical action upon each other. If these facts can be correctly ascertained we will be better prepared to bring about the proper result, as it will be evident that any process or condition that facilitates the natural, chemical or mechanical action of the material used will improve the mortar.

The common limes are nearly pure carbonates of lime, the only effect of burning them is to drive off the carbonic acid. By slaking them the lime becomes a hydrate, and in this state is capable of acting chemically, though feebly, on the surface of pure siliceous sand. As such sand is silicic acid, all alkalies are solvents in a greater or less degree. This combination causes the first setting of the mortar, which is also strengthened by the mere mechanical action of the sand. The greater part, however, of the lime has not combined with the sand, but remains in the state of a hydrate, in the proportion as the latter absorbs carbonic acid from the air it gives out its water and passes to the state of a carbonate; such mortar therefore acquires its final hardness and dryness when the whole of the hydrate has been decomposed and the water has been replaced by carbonic acid. In losing 22 per cent of water it combines with 46 per cent of carbonic acid.

We have now a general idea of the nature of the materials under consideration, and will proceed to make our mortar with the best lime and clean, sharp sand. (Lean in sand is always detrimental, but clayey earths are not necessarily so.) We will use our judgment as to the proper proportions of lime and sand, as a barrel of lime varies in strength as well as in quality, owing to the size of the lumps, and the sand varies in degree of coarseness. The lime should be slacked under water and not allowed to burn. This should be mixed with an abundance of good long hair before the sand is worked in. The hair should be thoroughly beaten before soaking so as to break up all clots, which are a source of weakness as well as a waste of material. The sand should then be well mixed in, as the grit assists in the separation of the hair, and a thorough mixing of the sand and lime at this time is very important, as it materially assists in bringing about the first condition of hardness by having every particle of sand in contact with the lime. The longer it remains in this condition, if moist, the better for freeing the silica of the sand.

The mortar is now ready for use if the lathing is properly done. Green laths are best for several reasons, they retain the proper width of key, which should never be less than three-eighths of an inch. While the dry lath as soon as wet, swell and pinch the key, thereby weakening it, shrink, as the mortar dries out, and repeat it with every coat of mortar, which must effect to some extent the bond between the lath and the mortar, the green lath retain the full width of key and shrink only once, and then very gradually, and do not split at ends by nailing as the dry lath. The joints should be broken every five or seven laths, as the settling of joints or the springing of a stud makes a crack by the opening of butt ends of lath. No knotty, sappy, or unusually thin lath should be used. They can be put on quite open, as we will use our mortar well haired and not wet and slushy, and to bring about this result we will temper the mortar 24 hours before using it, which will add materially to the first condition of hardness by bringing fresh particles of lime in contact with the silica of the sand, not pulled down and hashed up with water, but well tempered with the blade of the hoe as if for immediate use. When ready for use there will be less water in its composition, and yet it will be of proper consistency to spread. Mortar thus treated will make larger and stronger keys, being tougher, and the particles of lime and sand form a closer union, thus assisting the second or mechanical condition of hardness as well as the chemical action of the material. Mortar, like steel, is improved by working it. This coat should just cover the lath nicely, no matter how thin, as we will draw up on the same scaffold with a good heavy coat of brown mortar, made as the first, but without hair, and containing more sand. This we will leave with the proper application of the darby.

We draw up with brown mortar for the reason that the mortar applied to the lath requires more time to make it adhesive to the wood and toughness to hold the key from dropping. If it is drying weather the windows should be in, or the space covered with muslin to insure slow and uniform drying to assist in the third condition of hardness. At the proper time it must be well floated, not only for the purpose of leveling the surface, which is of only a secondary importance compared to the working up and compressing the mortar, but to bring the particles together, as a large portion of the

water has evaporated, leaving air spaces to be filled by compression. The proper time to float is when the larger portion of the water has evaporated and the moisture apparently gone; but the proper application of the float brings the moisture to the surface, leaving a nap on the surface of the wall.

Floating when dry does injury by weakening the parts when there is not moisture enough in the wall to make it adhesive again. When dry, finish with high-gaged stuff. The best and least wavy surface can be produced by laying on the gage-stuff with a float and drawing up with a trowel; the wooden float cuts through an inequality on the wall, while other smooth steel trowel has a tendency to slip over it.

The above method is two-coat work, properly speaking, calling for more labor than the usual way of putting on two-coat work. And we believe that it complies better with the conditions and natural qualities of the material used than any other process in practice. But as there is a very general belief that a good job of plastering should have three coats of mortar, it will be necessary to compare the merits of the two methods as practically in use. In three-coat work the scratch coat must be necessarily thin, as there is to be a brown coat over it; if the scratch coat were to be heavy, the brown coat would weaken by overloading the wall or ceiling, as the brown coat has to be sufficiently thick to cover the irregularities of the scratching and raking up of hair and mortar in scratch coat. Therefore, the thin scratch coat is cut up and weakened by the scratching, and being thin, it dries out rapidly, not having time for proper crystallization, and when dry the heavy sandy brown mortar requiring pressure to spread, springs and enflees the keys more or less. The lath, if dry, goes through a second swelling, and the brown coat dries quickly, as it has the atmosphere on one side and the lath and scratch coat on the other to absorb the moisture, and the union between the two coats is never perfect and can be often seen separating by the air on sides of casings, etc. And in regard to straightness, that should be done on the joists and studs previous to lathing. It is not good practice to overload lath to straighten a wall, and there is no reason why a straight wall should be made crooked by the application of  $\frac{3}{4}$  of an inch of mortar if properly applied. It might be well to say here that grounds  $\frac{3}{4}$  thick are sufficient for lath and plaster, and every wall should have that amount on all its parts.

By the two-coat process we get the proper kind of mortar on the lath for keys and adhesion to the wood, the brown coat with the proper sand for strength, which also prevents cracks by having sufficient sand to prevent shrinkage and giving as heavy a body as the lath should be required to carry, which is all in one body, the union being perfect and a thick moist body, which insures slow drying, and, what is of great importance, a plastic body to float and compress, if taken in the proper time and no hair to collect in tufts on the surface by floating. The strength of the above wall can be greatly increased by the addition of, say, one barrel of plaster of Paris to the hundred yards of the first application, as this coat is where the greatest strength and adhesion are needed. There are probably sufficient glutinous scraps in the hair to retard the set of the plaster; if not, a little glue size may be added, so that no inconvenience may occur by fast setting. By far the hardest walls we have ever seen were composed entirely of sand and plaster of Paris, about two parts of sand to one of plaster, mixed with hair and applied in the usual manner as common mortar.

## GOOD HEALTH.

## Removing Excrecences by Electricity.

A correspondent of the *Electric Review* furnishes the following interesting and novel facts under the above head: The wife of a friend of the writer had on her right shoulder a blemish in the form of a large mole, quite half an inch in diameter, which practically made it impossible for her to wear half or evening dresses, which should reveal her otherwise shapely shoulders. She accidentally heard of the electric operations, and, obtaining the address of the surgeon who performs them, she went without her husband's knowledge to his office and submitted to the operation. It required about a week to heal the wounds made by the needles with which the mole was perforated in every direction; then the mole, which had been burned to a dry, black crisp, fell off, leaving the shoulder perfectly white, and with only the slightest indication to show where the discoloration had been. A new skin formed over it, and there is hardly a noticeable blemish there now. Success inspired her to insist on her husband's undergoing the same operation on a more delicate part of his person—namely, his nose. He tells his own story thus:

"I had on my nose at birth, so I was told, a wen, which grew with my years until I became a man, and for many years it greatly disfigured my countenance. It was about the size of a pea, and was on my left nostril. It changed color from time to time, and would grow to be a frightful sanguinary red whenever I indulged myself with wines and liquors of any sort. I came to regard it at times as a gin-blossom, and an irreverent reporter in describing me once suggested that this object had evidently been one of long and patient

and costly culture. I went, on my wife's urgent entreaty, to her surgeon and asked him if it could be removed. He looked at it and suggested that it might be if I would not look upon the wine when it was red; but I told him I was born so. He examined further, and at once proceeded to operate upon it.

"I bathed my nose, first of all, in cocaine. It grew cold at first, then became perfectly numb, as though asleep from lack of circulation of the blood. It felt as if paralyzed. He then applied an electric needle to the wen, sticking it through and as near the roots as possible. There was no pain, though half an hour was consumed in the operation. Whenever he increased the current of electricity I saw billions of stars, and sparks seemed to flash from my eyes, and the eyeballs seemed to crack with each spark that apparently flew from them. When the operation was completed the wen was black, no longer red, and more unsightly than ever. He put flesh-colored court-plaster over it and kept it there for about a week. Then in washing it off the mass of blackened flesh fell away. A new skin formed, and you can barely see a small scar where the unsightly object once was."

## Celery as Food and Medicine.

Numerous cures of rheumatism by the use of celery have recently been announced in English papers; but the following, more in detail, is given on the authority of the *New York Times*: "New discoveries—or what claim to be discoveries—of the healing virtues of plants are continually being made. One of the latest is that celery is a cure for rheumatism; indeed it is asserted that the disease is impossible if the vegetable be cooked and freely eaten. The fact that it is always put on the table raw, prevents its therapeutic powers from being known. The celery should be cut into bits, boiled in water until soft, and the water drunk by the patient. Put new milk, with a little flour and nutmeg, into a saucepan with the boiled celery, serve it warm with pieces of toast, eat it with potatoes and the painful ailment will soon yield. Such is the declaration of a physician who has again and again tried the experiment, and with uniform success. He adds that cold or damp never produces but simply develops the disease, of which acid blood is the primary and sustaining cause, and that while the blood is alkaline there can be neither rheumatism nor gout. English statistics show that in one year (1876) 2640 persons died of rheumatism, and every case, it is claimed, might have been cured or prevented by adoption of the remedy mentioned. At least two-thirds of the cases named heart disease are ascribed to rheumatism and its agonizing ally, gout. Smallpox, so much dreaded, is not half so destructive as rheumatism, which, it is maintained by many physicians, can be prevented by obeying nature's laws in diet. But if you have incurred it, boiled celery is pronounced unhesitatingly to be a specific."

The proper way to eat celery is to have it cooked as a vegetable after the manner above described. The writer makes constant use of it in this way. Try it once and you would sooner do without any vegetable, with the single exception of the potato, rather than celery. Cooked celery is a delicious dish for the table, and the most conducive to health of any vegetable which can be mentioned.

**THE DYSPETIC'S IDEAL.**—A medical man mentions that like his father and paternal grandfather, he always had the power of voluntarily ejecting food or fluid from the stomach at any time. When troubled with acidity or nausea, the stomach is emptied at will without the slightest difficulty, and may be washed out with several glasses of water. At college this faculty was used for gain, large doses of narcotic poisons being swallowed for wagers, and afterward immediately expelled. An investigation is suggested to determine the cause of this gift, or what voluntary muscles account for it.

**THE VALUE OF CONDIMENTS.**—The value of the various condiments in the preparation of combination dishes is great. Used with discretion they stimulate the appetite and promote digestion, red pepper being specially valuable in this connection. The various herbs and spices are exceedingly valuable; salt is absolutely necessary to health, despite all contrary assertions of the food oranks, and the condiments employed in making salads promote the digestion and assimilation of all food eaten at the same time.

**THE USE OF VINEGAR.**—Experiments have shown that even so small a quantity of vinegar as one part in 5000 appreciably diminishes the action of saliva upon starch. One part in 1000 renders it very slow, and twice the latter quantity arrests it altogether. From this it is evident, says our cotemporary, that vinegar pickles, salads and other preparations in which vinegar is used are unwholesome, especially when taken with farinaceous food, such as bread and other preparations.

**HEALTHFULNESS OF SOILS.**—Extended observations at Paris and at Munich indicate that the sanitary condition of a location depends on the amount of water contained in the ground. The years in which there has been a large quantity of ground water present have invariably been the healthiest years, while those in which there has been a smaller quantity have invariably been one of the unhealthiest periods.

## Dakota Tin.

Prof. Carpenter's article on tin in the recently issued volume on the resources of Dakota by Commissioner McClure presents the matter in a very fair and concise manner. After calling attention to the manner of its discovery in 1883, and outlining the tin belt, he next proceeds to discuss the geological formation of the districts in which it is found.

"The tin stone is found in granite veins or dykes in the earlier or schistose Archean, shown upon the map, and which vary in width from a few inches to hundreds of feet. In some sections the veins consist of an albitic gneiss, that is, rock composed of albite feldspar and mica, through which is disseminated crystal of cassiterite. In other sections, as upon the west side of Harney's peak, the veins are composed of typical gneiss, that is, quartz and mica."

"The percentage of tin stone in the gneiss varies," Prof. Carpenter goes on to say, "but there are many veins carrying rock yielding from three to four per cent." That this is not a small percentage is shown by comparison with the mines of Altensburg in Saxony and elsewhere. The Altensburg yield is from one-half to one per cent; in Cornwall the yield is less than two per cent. "In the Palbiero district in Cornwall, as shown by the Government statistics, the yield is on an average of five years, .89 of one per cent," and yet, it is added, these mines yielded a fair profit.

Prof. Carpenter then gives at length a statement of the development of the mines in both the northern and southern sections of the tin belt, or region rather.

It will have to be conceded that the tin interests of the Black Hills have been advanced materially during the past year. This is noticeable in many respects. One rarely ever hears it disputed now that there is tin here. This was not the case a year ago. The well-known rarity of the metal was a cause of skepticism to many. Numberless instances could be cited where false hopes had been raised and millions of dollars squandered in prospecting for the valuable metal by similar announcements of the discovery of tin not only in the United States but in other parts of the world. And many believed in perfect good faith that the present discoveries would turn out in a similar manner. Besides, too much was claimed for the Hills by enthusiastic persons. Like the quack medicines which are advertised to heal everything and thereby cause the people to doubt their worth in any respect, the Black Hills were reported to possess every mineral known to the geologist. Many persons were thus led to believe that tin existed only in the imagination of the prospector.

The only question which is now unsettled is whether it can be found in quantities sufficient to pay for the reduction of the ore. This also, it seems, is being rapidly settled in the affirmative under the light of fuller investigation and development.

The whole matter is now undergoing a thorough examination by the parties who visited the Southern Hills last summer, and when a conclusion is reached it will settle the question probably for all time. The tin interests may actually be said to be in the balance being weighed, and every one heartily wishes that there may be nothing found wanting. Nothing else will add so much to the wealth of this country, or tend to fix its position so prominently upon the map of the world, as the establishment of tin industries.—*Deadwood Pioneer*.

## An Elaborate Watch Dial.

A gentleman connected with the Illinois Watch Co. has a wonderfully curious watch dial on a movement of this company's make. Instead of the roman numerals to denote the hours, there are 11 small but very distinct silhouette figures, representing a man starting out with his dog for a day's sport. At 7 o'clock he is seen starting out with his gun and dog; at 8 o'clock he makes a shot; at 9 o'clock he has a sand hill crane which measures as long as himself; at 10 o'clock the man and his dog are scared at the sight of a jack-rabbit, which is sitting upon his hind legs, with his big long ears raised above the bushes; at 11 o'clock the hunter takes a drink, and while at this attitude the dog sits in front of his master, with his nose pointing directly at the flask; at 12 o'clock the sportsman is seen sitting on a stump, and is eating a lunch—the dog is eyeing the piece of bread which the hunter has in his hand. At 1 o'clock he starts out to fish the rest of the day, and so he takes his dog and fishing tackle, and goes to the water; at 2 o'clock, the dog, which is behind the master, has been caught with the hook by an attempt to throw in his line; at 3 o'clock he and the dog are all straightened out again, and the line is in the water; he has both hands on the pole, and his foot braced on a stump by the water's edge, as though he had a tremendous bite; at 4 o'clock this man has got a big fish on his line, which has pulled him off his feet, and he falls on the dog and doubles him all up, but the man is holding fast to the pole, which is bent almost double; at 5 o'clock he is all straightened out again; his pole is thrown across his shoulder, and with his fish in the other hand he starts out for home, the dog following behind with his head hanging down, being all tired out. The man's name is also painted in the center of the dial in rustic letters.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

FROM SUTTER CREEK.—Cor. Amador Ledger, Feb. 25: The mines in this vicinity are looking well. Payday at the Wildman came this week, getting quite a little sum into circulation. The mill is running regularly, and the rock that is being crushed, from the 400-foot level principally, is of excellent quality. The Iowa is running steadily, and a good cleanup is looked for in a few days. The Lincoln mill is said to be looking well. They will have a cleanup in two weeks. The 800 feet of 15-inch pipe to run the compressor for the South Spring Hill is all delivered, and men are at work placing it in position.

SOUTH SPRING HILL.—Ledger, Feb. 25: At this mine they have made an important improvement in the utilization of power for running the air compressor. The air compressor has been placed in position at a point opposite to the planing-mill and ice factory, just above the reservoir. By this means all the water necessary to operate it can be had at all times, at a trifling cost, as, of course, it is again returned to the ditch immediately. From the air compressor a four-inch pipe is run to the mine, a distance of 3400 feet, to convey the power. This arrangement will save at least \$100 per month, besides enabling the compressor to run at times when water is scarce, which heretofore it has not been able to do. It is said, also, that even the mill can be run by this power.

MISCELLANEOUS.—At the Keystone, sinking operations were commenced last Monday. It is intended to go 300 feet deeper. The mill will be kept running as usual while sinking is being prosecuted. At the Kennedy, the work of putting up stronger hoisting machinery over the north shaft is progressing. This shaft is down over 500 feet, and the old works were not equal to going much further; so it was decided to put in the necessary machinery to carry the shaft as deep as the south shaft while the men were finishing retimbering and enlarging of the shaft, which will take a month or six weeks to complete. By that time the hoisting works are expected to be in running order. They will be fitted for either steam or water power. The shaft of the North Star is down 250 feet; about the same depth as when the direction of the shaft was changed some two months ago in order to avoid the hard greenstone. The bottom is in coarse slate, with small stringers of quartz occasionally to be met with. We are informed that the first cleanup of the Wildman mill gave an average of between \$10 and \$11 per ton—a yield which eclipsed the most sanguine expectations. The mill is to be enlarged to 20 stamps. Mr. Holland, an expert in the treatment of base gold-bearing ores, was in Jackson last week, examining the peculiar ore met with in the Middle Bar region. He claims that he can save over 90 per cent of the gold contained in the black metal and other quartz of that district. Water-power hoisting works are being erected over the south shaft of the Amador gold mine. The works are said to be similar to those over the other shaft.

## Butte.

ARASTRAS.—Oroville Mercury, Feb. 24: A correspondent at Enterprise writes the Mercury that Jo Meacham's quartz mine is now running two arastras, day and night, that are crushing \$9 ore, and he has no end of it in sight. Only three men are required to furnish ore. We are much pleased to hear such good reports from our friend Meacham's mine. Our correspondent also states that Messrs. Rutherford and Hallam of Oregon have purchased and commenced working an old ledge that once paid very largely. Mining is looking up in the Enterprise district, and no doubt that old mining camp will yet recover some of its former mining fame.

## Calaveras.

QUARTZ MINES.—Prospect, Feb. 24: One of the most promising quartz mines in the central part of the State is the Tiger mine at Rich gulch, this county, the property of the Ilex Gold Mining Co. of London, England. The owners of this mine for the past two years have been expending large sums of money in the development of their property. Several deep shafts, numerous tunnels and drifts and crosscuts have been made with the result of showing up a vast body of ore. The pay rock is exceedingly rich and has every appearance of extending to a great depth. The Risdon Iron Works of San Francisco have taken a contract to erect a 40-stamp mill up in this mine to be completed as soon as possible. It is expected that this mill when complete will be one of the finest and best-equipped mills on the coast, and will be able to pay running expenses of the mine with rock that will mill \$2 per ton. The mines situated near San Andreas have received new impetus in the past few months. Old abandoned claims are being reopened and all the quartz crupings in the vicinity are being prospected. The Mohawk mine, one and a half miles from the county seat, upon which work was shut down several years ago, has been purchased by a wealthy company and active operations commenced to develop its hidden treasures. Upon the success or failure of this mine hangs the fate of a number of other mines and claims upon the same lode. For a number of miles this lode crops out to the surface, and each cropping prospects well, free gold and high-grade sulphurets showing in the quartz. At West Point, Mokelumne Hill, Murphys, Copperopolis, Campo Seco and other parts of the county prospecting is being carried on to an extent hitherto unknown in the history of the county. The attention of Eastern and English capital is rapidly being drawn to this great bed of mineral deposits, and mining is yet but in its infancy in this historical county.

ATTACHED.—Calaveras Chronicle, Feb. 25: The Leavitt mine, just above the Big Bar bridge on the Mokelumne river, recently worked by G. W. Campbell & Co., has been attached by Constable Goodwin of this place in the interest of several creditors here. Hardenburg & Pilcher, well known in San Francisco, are part owners in the mine. Messrs. E. Vandell and G. Gama, a couple of young men of this place, have purchased the tailings from old Corral flat gravel mine, which they intend washing over again. A rich strike has been made in the new

shaft at the Cleveland mine near Big Bar. The new shaft is 300 feet west of the old one. A contract has been let for the erection of a 40-stamp mill on the Ilex mine at Rich gulch.

WEST POINT.—Angels Echo, Feb. 22: The mining outlook at West Point is very flattering and the mines now in operation there are all yielding good returns. Extensive developments will be made in many of the mines in that section as soon as the weather gets fairly settled. The prospect for West Point becoming prominent among the leading mining towns of the State was never brighter than at present.

ILEX.—We are informed that the Ilex mine at Rich gulch flat is immensely rich, and that extensive improvements are now being made on the property in the way of erecting heavy machinery. Considerable money has been expended in the purchase of new machinery for this mine of late, and as soon as the machinery is got in running order, extensive developments will be made in the mine.

UTICA.—The machinery for the construction of the new hoisting works on the Utica mine in this place is now on the ground. It is said that the engine is the largest ever brought to Angels.

ANGELS.—Several strangers, said to be capitalists from Boston in search of mining property, were in this town during the week. These gentlemen could not find a safer place for investment in mining property. Capitalists and mining men have been quite numerous in Angels during the past week. They are unanimous in their expressions as to the very promising and flattering outlook for this section.

SHEEP RANCH.—The Sheep Ranch mine, owned by Hearst & Haggin, and situated at Sheep ranch, is now 1000 feet in depth. This is the deepest mine now in operation in Calaveras county.

REED.—The bedrock has been reached in the Reed mine at San Andreas, and it is reported that the gravel prospects well. Judge Reed has labored long and energetically to tap the gravel channel of this mine, and we hope he will be richly rewarded for his efforts.

## El Dorado.

FOUR-FOOT LEDGE.—Placerville Observer, Feb. 27: The Tincup Mining Co., two miles south of Placerville, have their tunnel in 400 feet, and have struck a four-foot ledge of fine-looking ore.

BIG TUNNEL.—The contractors in the Big Tunnel have thrown up their contract, and the tunnel is now being pushed ahead under the active management of Supt. McNeal.

CEMENT.—The Chili Ravine Placer Mining Co. have made a crushing of cement gravel in their mill, which resulted satisfactory. They are now running a side drift from their main tunnel to strike rich flats or old river bars of gravel believed to exist in the hill. H. W. Roberts, superintendent of the Carrie Hale mine at Henry's Diggings, returned from San Francisco on Saturday. They have their tunnel in 400 feet and will now commence breasting out pay gravel. Their future is promising.

## Nevada.

RICH STRIKE AT THE DELHI.—Nevada Transcript, Feb. 25: E. Spafford of the Delhi mine near Columbia hill was in town yesterday. A deposit of the richest ore ever found in the Delhi was struck Thursday. The quartz contained so much gold it was with great difficulty removed from the ledge, and in pulling it out there followed it stringers of solid gold from six inches to a foot long. A few tons of it would be enough to make every person in the county rich were it divided among generally.

A GOOD PROSPECT IN THE CROWN POINT.—Grass Valley Union, Feb. 26: At the time that the ice blockade shut off the water-power from the mines some weeks ago the second, or 300-foot level of the Crown Point mine was filled with water, but the pumps were got to work again in time to hold the water below the first, or 180-foot level, upon which level since that time the work has been done, and the north-west drift from the shaft has been extended until it is now 250 feet in length. For some distance the walls have been from 12 to 14 feet apart containing ledge matter and a talc formation, which has not yielded much per ton, but a crosscut made within a few days has exposed a solid vein of quartz, two feet in thickness, which shows well in free gold, and will make handsome returns in the mill. To all appearance it is going to be continuous, and is considered one of the best discoveries that has been made in the mine. There has been nothing like it since the rich specimen rock was taken out about a year ago, and goes to prove that the Crown Point only requires the proper development to become a regular dividend-paying mine.

PROMISES TO BE A BONANZA.—Grass Valley Tidings, Feb. 25: The rich ore strike at the Pennsylvania mine, reported by the Tidings recently, still holds out and is even richer than first announced. Very high-grade quartz, well worthy of being denominated "specimen ore," was extracted yesterday and to-day. The vein all through is of high grade and of good size—two feet on an average, as understood. At the Pet gravel mine the water has been pumped from the shaft and the sinking of a 10 or 15 foot sump is under way. It is expected that on Tuesday next the extracting of gravel will begin.

ALPHA AND GOLDEN GATE MINES.—These properties adjoin the Idaho on the northeast. Samuel George, Sr., and Wm. H. George are the lessees. Work has been going on for several months at the Alpha and in this period water-power has been introduced from the Idaho system and Pelton wheels put in for hoisting and pumping purposes and for running the five-stamp mill on the property. The shaft is now 200 feet deep and there is a five-foot ledge of low-grade ore in the bottom. Sinking is still in progress, and when new drifts are opened up a 20-stamp-mill can be kept steadily at work by adding two or three men to the force now engaged. Though low grade, the ore is of uniform quality and warrants further developments. Thos. Poyzer of Alameda and James F. Rowe of this city are the principal owners of the Golden Gate claim, which is located on the same lead as the Alpha. Abram Bros. are the lessees of this property, and now have a crushing of ore at Rodgers' mill.

## San Diego.

STRUCK IT RICH.—Pasadena Union, Feb. 25: A letter received by S. B. Tubbs from his partner, John Peterson, who is at work on a gold mine owned by them in the Carga Muchacho mountains,

near Yuma, says they have struck it rich in a new shaft. Three feet of gold-bearing quartz has been developed, which will pay handsomely. Samuel Brown, who is also well known in Pasadena, is at work with his two partners on an adjoining claim and are developing a vein of gold-bearing rock. These mines are located six miles from Oglesby on the line of the Southern Pacific, and are less than a mile distant from the famous Carga Muchacho mine, which was sold for over \$500,000, and which gave the county such prominence in mining circles a few years ago.

## Shasta.

FROM WHISKYTOWN.—Cor. Shasta Courier, Feb. 25: J. S. Strode has commenced operations on his Dog gulch mine, and will make that section his headquarters. John K. Williams has plenty of water and is making the gravel fly in good shape.

## Sierra.

ST. LOUIS.—Cor. Mountain Messenger, Feb. 25: The Riffe Mining Co. have a very good prospect in the upper tunnel, and employ about 8 men. The Wahoo tunnel is not running very steadily at present on account of some machinery giving out, and lack of water. The Excelsior new tunnel is progressing finely, the boys having run about 350 feet. The company expect to strike pay-gravel in a few hundred feet more.

THE MOUNTAIN LEDGE.—This ledge is owned almost entirely by O. Sunderhaus, part owner in the Young America. Mr. Sunderhaus purchased the property from H. Warner, and is on the ground looking to its thorough development. The ledge is situated about 3 miles from Sierra City, and one mile west of the Young America, near the same elevation. Twenty-five men are working in and around the mine. No. 1 tunnel is in 400 feet, and, at that point, is a splendid ledge, from 7 to 10 feet wide, that all prospects very rich and shows a great deal of free gold. Tunnel No. 2 has just been started, and will be driven ahead as fast as possible; a 40-stamp mill will be running by the last of August. Billy Casserly is superintendent, and, though young, has the reputation of being very efficient in managing a mine. This ledge, by all accounts, is one that will equal, if not excel, the richness of the Young America.

ENCOURAGING DEVELOPMENTS.—The gravel in the Wide Awake main tunnel, in 700 feet, was down, at last accounts, half-way—3 feet—from the caps at the face, heavy wash, blue-colored with soft, black slate-swelling bedrock. The gold found is very coarse; the largest nugget, after cleaning up one box, weighed a half-ounce. A breaster, 150 feet from the face, is realizing \$10 a day. A well-washed quartz boulder required a week's blasting before being removed from the main tunnel. Bedrock is still pitching a little. Until water season opens further development will progress slowly. Supplies are laid in sufficient for 7 men until the 1st of June or later.

PIKE CITY.—Mountain Messenger, Feb. 25: Pike City is a very dull town. About 90 men have gone to work out of 120 of the strikers. John Nelson has been appointed receiver, and Col. Bates and Mr. Nelson have gone to the Bay and are expected to return in a week. The miners are promised a payday on the 10th of next month, and everybody here hopes they will have it, as coin is badly needed in Pike City. The miners say the mine looks well and don't see why there is no payday. The Sunflower Co., at Pike City, are going to put on a double shift the 1st of March. Their tunnel is in 190 feet—as fine as there is in the county—300 feet from the shaft, 80 feet deep, ledge extending from top to bottom; widening the deeper they go, and the rock prospects well.

PAGE LEDGE.—The old Page ledge, up Sailor ravine, owned by Sam Baker and J. Cowden, is very promising. They have found it on the surface and in several short tunnels. It is at present about four feet wide, and where found, always prospects thoroughly well in free gold. What is in sight, with some kind of machinery, would yield good wages. The ledge has a good backing in the direction of and under the mountain toward the old Excelsior gravel claims.

## Tulare.

GRAPHITE.—Tulare Times, Feb. 22: Graphite, or black lead, has often been found in small deposits in the mountains to the east of this city, and at one time a mine of this mineral east of town had considerable work expended on it. But the deposit was too small to prove profitable in working it and the business was abandoned. Lately a more extensive deposit has been found, where several tons a day can be extracted, and its locators propose working it if they can find a profitable market for what they can deliver in this city.

## Tuolumne.

BIG STRIKE.—Sonora Democrat, Feb. 25: It is reported that an immense bonanza has been discovered by Messrs. Kinney and Hastings in their mine above Yankee Hill. The exact amount is not known as yet, but enough has been learned to place it way up in the thousands. This is another case where success comes after many years of privation and labor.

BIRNEY MINE.—This mine, above Columbia, has never at any time looked so encouraging as it does at present. A large body of ore has been uncovered and experts say that it will pay \$20 per ton. With good weather and everything to facilitate operations, there is no reason why the next few months should not give forth immense results.

BALD MOUNTAIN.—The pocket miners of Bald Mountain are doing well, and large amounts of gold are coming forth. May the old mountain continue to yield to its workers, and may it never become half of the golden treasures.

EXPERIMENTAL MINE.—The above mine, near Columbia, is now doing splendidly, and the owners thereof are in excellent spirits concerning its ultimate great success.

NEW ALBANY MINE.—Those enterprising young men, Messrs. Kirk and Long, who some time ago leased the New Albany mine of Dr. Walker, have, we understand, made a splendid and gratifying development. Some of the rock is quite rich in free gold, and all the quartz that we have seen is of good gain and of a superior structural character. At present it is impossible to give a clear, succinct account of the value of the ore, or the magnitude of the chutes. It is, however, sufficient for the present to state that should the present find hold out as it is now, Tuolumne county will yet have a bonanza

of such character and value that the eyes of the Pacific Coast will turn with amazement toward this mine in the rugged wilds of the Tuolumne river. We expect a full account shortly.

## NEVADA.

## Washoe District.

UTAH.—Enterprise, Feb. 25: On the 472 level the incline upraise in west crosscut No. 2 has been carried up 15 feet; total height on the slope, 60 feet. Owing to an excess of water in the face of the upraise, work at this point has been temporarily suspended. It is thought that the water will soon run down. The face of the upraise is still showing quartz and vein porphyry. Opposite west crosscut No. 2 have advanced east crosscut No. 3 12 feet.

HALE AND NORCROSS.—On the 400 level the south lateral drift has been extended south 60 feet and continues in fair-grade ore on the east side. Are merely skirting the ore body. In the north drift on this level the west crosscut has been advanced 50 feet in vein material. On the 700 level in the south upraise are 109 feet above the track-floor, and have started a drift from the top of this raise to connect with the north raise. It is out 15 feet and continues in the same quality of ore. From the north upraise are driving a south drift to connect with the north drift; it is out about 13 feet in fine ore. All the stopes show the usual grade of ore. Are shipping about 50 tons a day to the Vivian mill. Have about \$25,000 of bullion on hand.

CON. CAL. AND VIRGINIA.—The stopes at the bottom of the winze sunk below the 1435 level are still yielding large quantities of ore of high grade. The prospecting drifts on the 1600 and 1650 levels are showing quartz that is beginning to carry some metal. The usual amount of ore has been shipped to the Morgan and Eureka mills, on Carson river, during the week. The battery samples are running about the same as last week.

SAVAGE.—On the 400 level the north drift has been connected with the upraise from the 500 south drift. This connection increases the ore-supply and adds to the ventilation. On the 600 level are stoping ore north and south of the shaft. On the 750, 850 and 900 levels the usual quantity and quality of ore is being stoped. Are shipping about 140 tons a day to the Mexican mill. Have bullion on hand amounting to about \$54,000.

BEST AND BELCHER.—On the 425 level the main north drift has been extended 25 feet; total length, 525 feet. The formation continues to be porphyry and quartz. Upraise No. 1, started at a point 130 feet south of our north line, has been carried up 20 feet; total height, 70 feet. At this point have cut the west clay and have started a west crosscut. The formation is a mixture of clay, porphyry and quartz.

GOULD AND CURRY.—On the 250 and 300 levels are still extracting ore. Have extracted during the week 140 tons of fair-grade milling ore, which is stored in drifts in the mine. On the 1300 level the south drift from the east drift has been extended 46 feet; total length, 336 feet. The formation is soft porphyry and clay, showing some water.

OCCIDENTAL.—In No. 1 upraise, 35 feet above the upper tunnel, a south drift has been advanced 15 feet. On the 100 level No. 2 upraise in the east crosscut, north of the raise, the north drift has been extended 11 feet; total, 63 feet. On the 200 level, 65 feet below this level, the north drift has been extended 8 feet; total, 24 feet. Have extracted from the mine 58 tons of fair-grade milling ore.

BELCHER.—The usual progress is being made in the crosscut on the 400 level. There is no change of material. On the 500 level the south drift continues in vein material of a favorable quality. The flow of water has considerably decreased. The drift to connect with the Suro tunnel is still being pushed ahead.

ALPHA, IMPERIAL AND EXCHEQUER.—The face of the northeast crosscut on the 122 level is in quartz that shows some metal. On the 222 level the north lateral drift continues in low-grade quartz. On the 382 level the south lateral drift is still in ore of fair grade, and the north drift is in quartz that yields low assays.

CHOLLAR.—The north drift on the 550 level is still showing good milling ore. The north drift on the 450 level is showing bunches of good ore. The south drift from the Hale and Norcross on the 400 level, which is now in Chollar ground, is being driven alongside the vein.

POTOSI.—Ore is being extracted from the 250, 350 and 450 levels. The usual amount of prospecting work is being done, and ore is being shown up at several points, at some of which large and valuable deposits are liable to be found. The battery samples average about \$25 a ton.

ALTA.—Are running prospecting drifts alongside the vein on the 725, 825 and 1150 levels. Good streaks and bunches of ore continue to be found in the upraise in the Keystone from the 725 level. The mill will shortly resume crushing ore.

OPHIR.—The fine body of ore (35 feet in width) developed on the 1465 level continues to improve as opened up. It will prove a very productive and valuable deposit.

WEST CON. VA. AND CAL.—Good progress is making in sinking the main shaft. Since the melting away of the snow there has been no trouble with surface water.

ANDES.—The usual progress is being made in the several prospecting drifts, and some streaks and bunches of ore are occasionally encountered.

SEGREGATED BELCHER.—On the 1300 level the south drift from the upraise is in vein porphyry that shows some streaks of quartz and seams of clay.

SCORPION.—Are drifting north and south on the 300 level. The north drift is out 120 feet and the south drift 85 feet.

BENTON.—Are drifting on the 725 level. The material is vein porphyry with streaks of quartz and some clay.

MEXICAN.—West crosscut No. 2, on the 1300 level, is still in vein material which shows some metal.

BULLION.—The usual drifting and prospecting work is in progress.

UNION CON.—West crosscut No. 2, on the 1300 level, is still in a soft formation of porphyry.

SIERRA NEVADA.—The south drift on the 520



level is still in a vein material composed of quartz, clay and porphyry.

#### Battle Mountain District.

**GALENA.**—*Silver State*, Feb. 27: At Galena, which is situated in Battle Mountain mining district, work has been resumed at the mills, which were shut down in consequence of the scarcity of water during the unprecedented cold weather in January. Two companies, which mean business and understand mining operations, are at work. These are the Blanco G. & S. M. Co. and the Bunker Hill G. M. Co. They have opened their mines in an extent that has assured them an unlimited supply of ore for an indefinite period.

#### Eureka District.

**ORE SHIPMENTS.**—*Sentinel*, Feb. 26: During the past week ore shipments were made from the mines of the district as follows: To the Richmond Company—Dunderberg mine, 16 tons; Leone, 5; Jackson, 37; General Lee, 4; Wide West, 1½; Silver Lick, 25; Bullwhacker, 3; Williamsburg, 7. Eureka Con.—Hensley, 1 ton; Jackson 30 tons; Silver Lick, 10.

#### Dun Glen District.

**THE NEW MILL.**—*Silver State*, Feb. 23: J. V. McCurdy, who recently purchased the Lang Syne mine at Dun Glen, which will henceforth be known as the Lang Syne Mill & Mining Co., has commenced work on the new mill. A force of men under the supervision of J. L. O'Donnell, an experienced millwright, is now framing the building. A part of the machinery has arrived, and they expect to have two mills running before April 1st. The capacity of the new mills will be about 70 tons a day, and with the mill now in operation about 85 tons of ore a day may be reduced. The mine is developed to such an extent that it can be made to produce an unlimited quantity of ore, and it will be worked exclusively for gold.

**GOLD BULLION.**—J. V. McCurdy shipped bar No. 1 from the Lang Syne mine at Dun Glen Tuesday. It was gold and worth about \$14 per ounce. It is greatly to be hoped that similar bars will continue to be shipped regularly, as the mine gives employment to quite a number of men.

#### Gills District.

**THE STAR MINE.**—*Walker Lake Bulletin*, Feb. 23: The shaft of the Star mine is now down 90 feet. There is good ore at the bottom and there is a quantity on the dump which has been taken from the shaft since the last shipment. The 100-foot level will be reached this week, when a drift will be started.

#### Marietta District.

**LOOKING WELL.**—*Walker Lake Bulletin*, Feb. 23: The mines of Marietta district are looking better at the present time than for many years past. Indeed, I doubt if there has been at any time in the past as good a showing for the number of men at work. Several carloads of high-grade ore are now ready for shipment, only waiting for the snow to go off sufficiently to allow it to be transported to the railroad. The Endowment, through the intelligent prospecting of Messrs. Smith & Means, is showing up finely. High-grade ore and plenty of it. The Big Buffalo, owned and worked by McClellan & Bradley, shows steady improvement for each day's work done on it. The ore is rich and the ledge strong and well defined. M. M. Comstock is making a good showing on the Champagne. He is all ready to make a shipment as soon as the state of the roads will admit. F. Maguire is taking considerable lead ore from the McDonald; Frank is a stayer from "away back." Tom Mackey is also getting considerable lead ore from the Rip Van Winkle. Messrs. Cook & Peterson are taking rich ore from the old Sunset mine. This is one of the most promising locations in this section. Several copper mines in this vicinity will certainly be worked the coming spring if copper holds up to the present quotations.

#### Tuscarora District.

**NAVAJO QUEEN.**—*Times-Review*, Feb. 24: Are now putting in station timbers on 200-foot level. Total depth of shaft to date, 206 feet. Progress during the week, 6 feet.

**BELLE ISLE.**—The prospecting of the old stopes on 250-foot level is developing some good ore.

**PONDERE.**—East crosscut has been extended 16 feet since last report; total length, 137 feet. Have cut a ledge 3½ feet in width, which looks remarkably well.

**GRAND PRIZE.**—The stopes are producing, and looking well. Average pulp assays for the week, \$205.37. Everything at mine and mill running all right.

**NAVAJO.**—South drift from No. 1 upraise on west lateral vein has been extended a total distance of 75 feet. The face continues in good ore. No. 2 upraise is up 25 feet.

**FOUND TREASURE.**—Southeast drift, 150-foot level, has been advanced 15 feet; no change of interest in the vein. Stop above No. 1 chute is yielding high-grade ore in fair quantity; average of ore taken out during the week, \$535.40 silver, \$72.34 gold; value per ton, \$707.74. An upraise has been started southeast of the crosscut to connect with the winze on the 200-foot level, and has been carried up 8 feet, showing high-grade ore all the way.

**NORTH BELLE ISLE.**—North lateral gangway, 400-foot level, extended 25 feet. The face shows seams of high-grade ore, and there is quite an increase in the flow of water; total, 122 feet. The usual output of ore has been made during the week. The settler at the mill that gave out last week has been replaced and started up last night.

**COMMONWEALTH.**—On the 150-foot level, No. 1 drift has been advanced 18 feet. An upraise was started near the face and has been passing through low-grade ore the last 15 to 16 feet, giving assays of from \$18 to \$172 per ton. This upraise is west of the main shaft 72 feet. The vein being so flat it would be a long distance to run before reaching the ore, so this upraise was put up to prospect the ore body. A crosscut is being run west from where the upraise was started, and will cut the ore on the level, but has considerable distance to run yet. North drift from 150-foot level station has been advanced 20 feet in vein formation. An upraise has been started near the face, and last night cut into very rich ore which has every appearance of being large. This is the same ore that was followed north by the north drift on the 200-foot level, and as the ore

dipped below the bottom of the drift on the 200-foot level, work was discontinued.

**NEVADA QUEEN.**—Winze on east vein has been sunk 12 feet; bottom all ore; have had to stop, there being too much water to hoist with a windlass. The north drift has been advanced 17 feet. The ore taken from this drift during the week has been high-grade, and will mill over \$300 per ton. Face of drift is now all in ore, and is better than at any time heretofore.

#### Wild Ross District.

**PARADISE VALLEY.**—*Silver State*, Feb. 27: Ore produced and delivered to the mill, Paradise mine, 89,500 pounds. Average assay value in ounces per ton—silver, 10.85; gold, 0.68. Mill run 168 hours, lost no time and reduced 35 tons of ore and 70 tons of tailings. Concentrates produced 336 sacks, 23,178 pounds, per value \$2282.17, which were shipped to the Selby Smelting and Lead Co., San Francisco, Cal. Mill work—Three Huntington centrifugal roller-mills and six Triumph concentrators. Number of men on pay-roll, 46. The upraise, north drift, Wild Goose, lower level, shows a slight improvement in size of vein and value of the ore. Everything running steadily at the mill and mine.

#### ARIZONA.

**NOTES.**—*Prescott Courier*, Feb. 23: Thirteen sacks of ore from Smith & Bigelow's new mine have been received by Geo. W. Sines. It samples \$89.40 per ton—\$49.95 in gold and \$41.55 in silver. Mr. Osenburg, just from Bradshaw district tells of fine ledges there. He found Mr. Long, foreman of the O-o Bella Mining Co., pushing work on the company's ledges. His men were tunneling and drifting. Men employed by the Moody & Place Co. were working in very rich ore. Ore from Ben Rybon's Ruby mine in Walker district, assays big in silver. George Ropeter has sold one-half of his claim on the Biggs lode to a Prescott gentleman of means, and the work of development will now go on. Pack trains, with ore, arrived at the sampling works yesterday. The Schofield mill, Big Bug district, is being put in condition for work by Mr. Cartmell. John S. Jones, manager of the Standard Milling and Mining Co., has about 100 tons of ore in the bins, and will start his mill to-day or to-morrow. Frank Alters, one of the owners of the Catoctin mine, is here, shipping ore. Ed Wagoner has gone over one-third interest in the lease of the Lynx creek hydraulic mines, and has gone to work in the mines. We see it stated that the Silver King mine of Pinal county, this Territory, has paid in dividends the large sum of \$1,192,000. Mr. N. Ellis, manager of the Clarecote-Ruby mine and mill, arrived at his home in this place yesterday. He has men and teams engaged hauling timber to the mine.

**RICH ORE.**—*Florence Enterprise*, Feb. 25: The Bunker Hill district, 12 miles east of the Mammoth camp, has long been famous for its rich ores and many of its mines are very valuable. A mill or smelter could do a fine custom business there. Among the exceedingly promising prospects are three owned by Mr. I. Hinderliter, who is occasionally made a shipment of ore from which really handsome returns have been received, the lowest being \$398 per ton and the highest \$999.75. Of course, this was selected ore of the best description, but it demonstrates the fact that the mines contain something worthy the attention of mining men. Wood, water and limestone and iron fluxing are convenient to the mines and the ore could be smelted at a minimum of expense.

#### COLORADO.

**SILVERTON.**—*Miner*, Feb. 22: The Lackawanna begins shipping 10 tons per day on Monday. The Sunnyside Extension is working 12 men and has a large amount of ore on the dump. The Belle of the West and the Vanderbilt, two Red mountain mines, are sending in regular daily shipments to Silverton. The Emerald boys are still pegging away and will have a nice bunch of ore to ship in the spring. The great crosscut on the North Star on Sultan will reach the vein in March. Over 100 men will be required to work the North Star the coming season. The North Star on Solomon on Wednesday of last week had as much ore out as was extracted up to the 10th of May the year previous. Had the open winter been expected, shipments would not have been suspended at all. The trail is now nearly bare, and two men could open it in a week. The North Star will more than double its usual output this year. The lessees of the Whale made a rattling good strike in the lower level the fore part of the week, which will, if it holds out, amply repay the boys for their winter's labor. The *Miner* has received a letter from Mr. M. M. Engleman of Canyon City, one of the owners of the Sunnyside mine, in which he states that he will arrive early to start work on other mines near Eureka of which he is owner, and possibly the erection of a large concentrating mill. He has been in the mining business for 16 years and thinks the San Juan is the richest district he has ever seen in America. There is much interest manifested on the outside in the Silverton district, and he expects that many of our mines now idle will be started up next season. There is a vast empire of territory near Silverton that offers unparalleled inducements to the prospector. It is a domain of treasure that has most unaccountably been overlooked in the mad rush of early days in the mistaken idea that large croppings of quartz and a rich vein are never separate. It is doubtless owing to the dearth of large quartz croppings in the immediate vicinity of town that so little prospecting has been done. There is the same formation, the same characteristics of rock, and we are convinced that better, richer float, and more of it, cannot be found elsewhere in the county than around the foot of the mountains bordering on Baker's park. There is no other way to account for the neglect of this seemingly rich country except the absence of croppings; that the ground is rich in mineral has never been disputed, and we predict that the time is not far distant when the ground indicated will be the real beehive of the San Juan.

**LEADVILLE AND ASPEN.**—*Denver Republican*, Feb. 23: Leadville and Aspen are by all odds the leading producing mineral sections of Colorado, and are now running a pretty race for first place in the value of the output of their mines. Leadville has taken no backward steps, but on the contrary has advanced considerably in the number and strength

of her great ore chutes, besides adding to the limits of her resources to the north, south and west. Aspen has sprung into her greatest prominence within the last six months by the richness of her ore bodies in old as well as new properties. The grade of her ore is higher than that of Leadville and the bulk of her deposits are fairly rivaling those of the latter. One year ago Aspen was merely striving for second place without much thought of measuring strength for full rivalry, but now there are many who think she can eclipse Leadville within the next two years, both in richness and bulk of ore. This is a marvelous change, but it must be borne in mind that it is no wise detracts from the intrinsic worth of Lake county mining properties, but merely demonstrates the greater extent and probabilities of Pitkin county's resources.

#### DAKOTA.

**HOMESTEAK.**—*Black Hills Pioneer*, Feb. 22: Concerning the proposed change to steam-stamp at the Homestake, the only question to be considered is whether the stamps will crush fine enough to amalgamate. There is no question as to their economy or efficiency, both having been fully tested. With the same power very much more ore can be milled, and hence a corresponding increased number of men employed. Should the experiments now being made prove successful, the company will undoubtedly make the change.

**RUBY BELL.**—Close calculation of the value of ore in sight in the Ruby Bell mine, fixes it at \$260,400. A continuous body of ore 124 feet long by 14 feet deep has been disclosed by actual development works. The average value of the ore is \$25 per ton, and it was on this basis that the calculation was made.

**MUTUAL.**—Excellent reports from the mine were current on the streets of Deadwood yesterday and the day before. It is said that the ore body has been explored over 30 feet, and that its dimensions appear to be increasing rather than diminishing. The average value of the ore, as shown by assays recently made by Mr. Terhune, is \$27 per ton, gold. Chief importance attaches to the find by reason of its occurring beneath the lime contact, which by general consent had previously been supposed to mark the depth at which ore would be found. The U. S. Grant, B. G. Hill and War Eagle companies are each likely to profit by the discovery, as the southeasterly trend of the vein must carry it through their ground.

#### MONTANA.

**SOME FINE ORE.**—*Inter-Mountain*, Feb. 21: E. H. Irvine and Bryan Irvine are feeling pretty good over a late development in the Narrow Gauge. In the ore body which they are opening they have a streak of high-grade ore which is from 10 to 12 inches wide and assays something over 300 ounces to the ton.

**THE QUARTZ PLACERS.**—*Salt Lake Tribune*, Feb. 24: John Groesbeck, who is interested in the placer claims on Quartz creek, in Missoula county, Montana, about 50 miles below Missoula City, left last Sunday to spend the summer there in mining. In a few days his brother, N. Groesbeck of Springfield, will start to join him in this enterprise, and will take five or six men with him, one of whom is a sawmill man, to operate a mill to manufacture lumber for flumes. A force of men have been working on the claim for some time, making a cut through a point of the bar where the gravel is 150 feet deep. The cut is over 100 feet deep, and colors were found all the way from the grass roots down. At the bottom of the cut, where it is over 40 feet above bedrock, the gravel shows six or eight colors to the pan. John Snell of this city, who is one of the owners of these placers and who spent last year there, is very enthusiastic over the prospects of the company in their work this season, but as John Groesbeck has gone to take charge of the work, Mr. Snell will remain here and engage in his old business as a contract builder. These placers are so situated as to have convenient plenty of water and timber, but are of such character as to require large operations, which the company have provided for in their preparations for working.

**SAN FRANCISCO CON.**—*Phillipsburg Mail*, Feb. 24: The shaft now has a depth of 358 feet. At 300 feet the vein turned slightly and took a more vertical pitch, and the shaft being continued at the same inclination as before is now in the country rock south of the vein. Occasional crosscuts show the vein to hold well in width.

**WEST GRANITE.**—At the 400-foot level of the Rattlesnake an extra pump has been placed in position and is now operating actively, which places the water well under control and has enabled work to continue. The vein continues to make to the north.

**GRANITE.**—The output for the week ending February 18th was 36 bars, containing 60,703.60 ozs. fine silver, and 33.41 ozs. gold.

#### IDAHO.

**A NEW ERA ON WOOD RIVER.**—*Times*, Feb. 22: The purchase (or bonding with privilege to purchase, which amounts to the same thing in this case) of the Idahoan mine by the Alturas syndicate of English capitalists, will mark a new era on Wood River. Such a powerful organization as this will not rest content with one "lead" property. Having touched that class of mines at all, it will not stop with one purchase, but doubtless stand ready to take hold of any promising mine which may be offered in this vicinity at reasonable figures. This will greatly stimulate claim-owners, who will know that if they cannot secure the capital to properly develop their properties, they can at least sell them for something like their actual value, and this will inspire other capitalists with confidence in our region, and lead them to invest here. With Craig Chambers and Prof. Jenney operating the Dorango and Bullion-Ophir groups, the Alturas syndicate at the Idahoan, Colonel Thompson at the Rising Sun, Charles Popper at the King of the Hills, Mr. Venable at the Red Cloud, Messrs. Flannery and Burns at the War Dance, the Red Elephant Co. at their group, and the number of other competent mine-managers in the district, Bullion and vicinity would boom this summer as it never did before.

**SIGNS OF THE TIMES.**—*Wardner News*, Feb. 25: There are unmistakable signs from all quarters that the anticipated boom this season in Coeur d'Alene

will prove no romance, but will make itself plain in stern reality. The season opens most auspiciously and the latest reports from abroad are most satisfactory. In the great business centers of the East, money is plentiful and every man or corporation that needs capital can obtain it on strong collateral. Many are taking advantage of the plenitude of cash and unhesitatingly say that the great amount of idle capital will soon be diverted to speculative securities and good and safe investments. It is certain when the season is fairly opened the market will feel the impetus and everything will be lovely. We will witness many changes, some reorganizations, and it is well known that numerous important schemes are on foot, the development of which will have a remarkable effect on our community and enliven matters wonderfully.

#### WASHINGTON.

**BOUND FOR SALMON RIVER.**—*Ellensburg Capital*, Feb. 23: Those who believe it is only the early bird that catches the worm are now outfitting in Ellensburg for Salmon river and the Big Bend. The fine weather is causing the tide of immigration to set in early, and the indications are that fully 10,000 people will go to Salmon and the Big Bend this year. As all are possessed of some means, and as the mines will begin to give returns, flush times may be expected this year. The merchants of Ellensburg, who did a large business with Salmon river last year, expect to double their trade this year, and the indications now are that they will not be disappointed.

#### NEW MEXICO.

**KINGSTON.**—*Shaft*, Feb. 22: The mines of Kingston are becoming known in all mining circles from London to California, and people are becoming interested at all points between. Some of our citizens are in communication with capitalists who are becoming interested in some of the most valuable mines of our rapidly rising empire. G. W. Chase and Jim Dennis have good ore on the Signal, adjoining the Charm on which Hume has made the new strike. The Tierra Blanco is looking up. This is on the south end of the Kingston belt; \$95 ore—this means both gold and silver. The new strikes are down that way as well as on the north.

#### OREGON.

**GRANITE CREEK.**—*Bedrock Democrat*, Feb. 20: From Dr. A. J. Thibodo, who returned from the Granite creek district last Wednesday evening, whither he went to look after mining interests, we glean the following notes of progress of work in that section: Snow is fast disappearing, only about 10 inches of snow at Independence and about 2 feet at the Monumental mine. The Buffalo mine, owned by a Pendleton company, and being worked by Messrs. Pugh & Meyers, has been developed to the extent of a 40-foot tunnel this winter, the ledge vein being 10 inches in width and showing an exceedingly rich body of ore. John Cable, of the La Bellevue, reports having taken out more shipping ore this winter than ever before. Their tunnel is in 220 feet, and the pay streak of the ledge is from 4 to 5 feet in width. The Wide West, owned by Garrison, Lucas & Flaherty, and a continuation of the La Bellevue, is showing up equally as well, and a large amount of shipping ore is being taken out. I. K. Klopp's group of mines in the same vicinity are showing up well, and he, also, is taking out a large quantity of fine shipping ore. Great excitement prevails among the miners in the vicinity of Greenhorn mountain over recent very rich strikes and the encouraging outlook of all the mines. All the mine-owners of the Granite district are greatly encouraged from the result of the winter's work on their properties, and the doctor himself says that there is bound to be a mining boom in that section the coming summer, as the richness and extent of the mines fully warrant it.

**PROSPECTIVE.**—*Rogue River Courier*, Feb. 23: Tunneling is being carried on at a lively rate in the Hutch & Drew gold mine at Gold Hill, an output from which is realized about \$40 per ton in near the average work. This is decidedly encouraging to Messrs. Hutch & Drew, who feel quite elated over their good fortune. It is expected another quartz-mill will be put in some other mine in their neighborhood soon which will afford the opportunity of having the gold separated from the rock with greater facility.

#### UTAH.

**ANCHOR TUNNEL.**—*Park Record*, Feb. 25: Early Tuesday morning connection was made in the Anchor drain tunnel at a point about two-thirds of the way up from the mouth to the intermediate shaft. There was a variation of four inches in the grade and but six inches in the side lines. However, it is considered a very good connection. Now there is clear "sailing" from the mouth of the tunnel to a point about 500 feet past the intermediate shaft, making the entire distance in the neighborhood of 2500 feet, leaving 4100 feet to be driven before the future bottom of the Anchor shaft is reached. This is rapid work for a trifle over six months.

**CAMP CROSSCUTS.**—Owing to the bad condition of the road, ore shipments have been very light the past week. The Sampson's working force has been increased, and as soon as the roads get in good condition the ore shipments will be resumed on a large scale. The Story group, which is above and close to the Ontario's No. 3 works, is on the eve of making a stride to the front. Sinking in the Crescent's incline shaft has been resumed, the water pocket having exhausted itself. Word comes from an authentic source to the effect that the Dolberg group, which lies between the Morgan and Anchor and southwest of the Daly, has been sold for a good round sum to a Montana capitalist.

**ORE AND BULLION SHIPMENTS.**—During the week the Crescent shipped 160,000 pounds of first-class ore. The Mackintosh sampler received no ore this week because bad roads prevented hauling. Last Saturday the Ontario shipped 33 bars of bullion, containing 18,682.40 fine ounces of silver. On Wednesday 10 bars of Daly bullion, containing 12,892 fine ounces of silver, were shipped from the Marsac mill, and to-day the product will be six bars,



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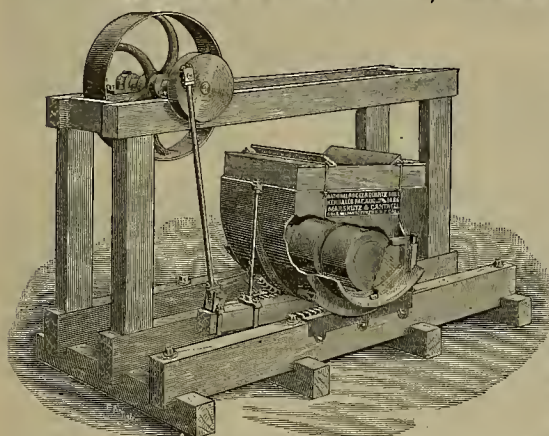
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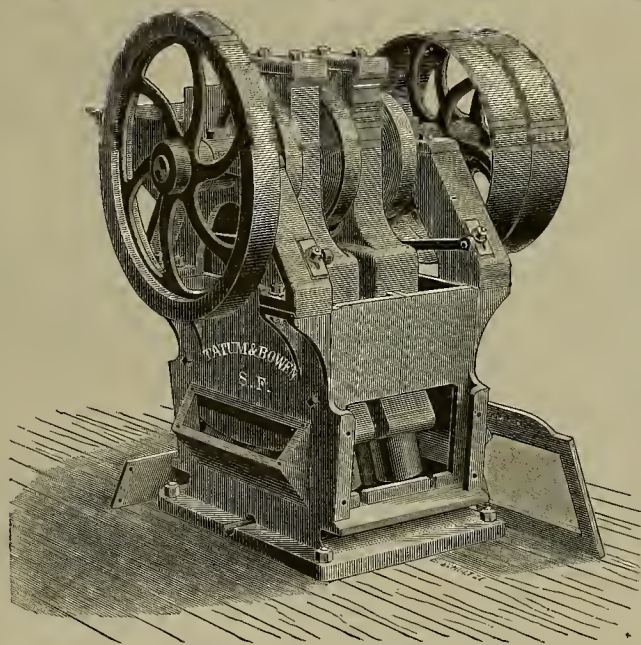
MARSHUTZ &amp; CANTRELL.

The Patentee and Manufacturers cordially invite miners to critically examine and pass judgment upon this improved system of milling and amalgamating ores in the following particulars:

1. The cost is less than one-half of stamps of same capacity
2. The freight to mine is less than one-half of stamps.
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4. The power to drive it is less than one-half of stamps.
5. The wear is less than one-quarter of stamps.
6. There is no wear except on shoes and dies.
7. In point of amalgamation it is superior to any other machine in use.
8. In its simplicity of construction.

We challenge competition with Stamps, Ball Pulverizers or any other ore crushing machines now before the public.

## THE DOUBLE "ECONOMIC" STAMP MILL.



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

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Goes with each Mill. We also have a suitable

## Rock Breaker.

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

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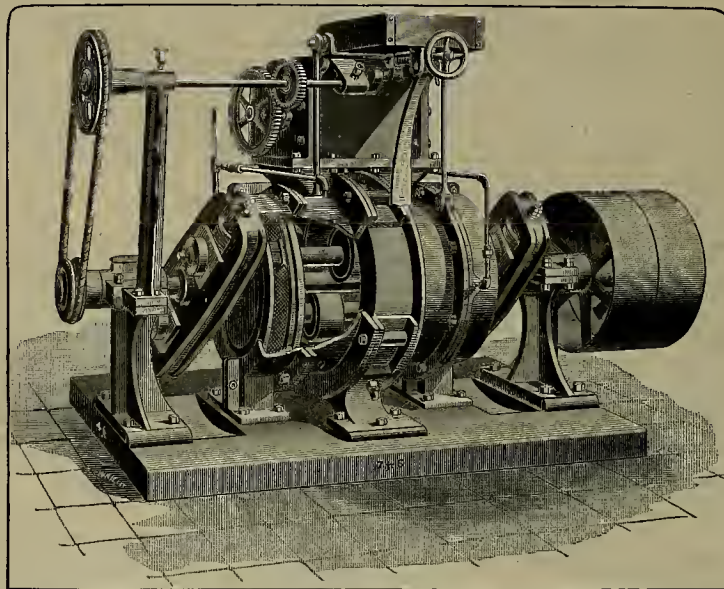
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This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.

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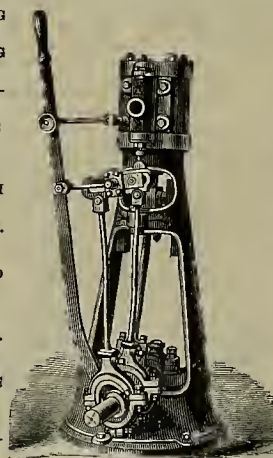
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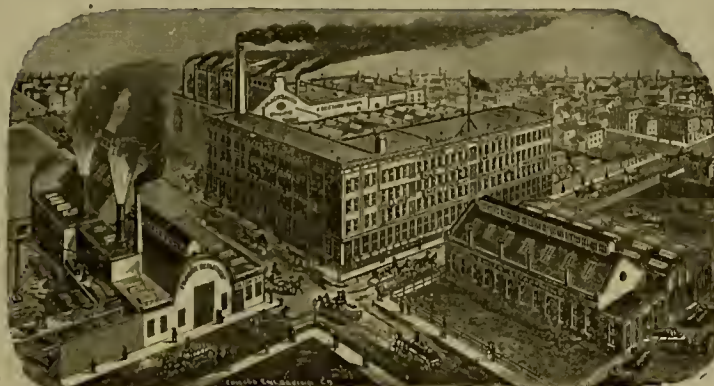
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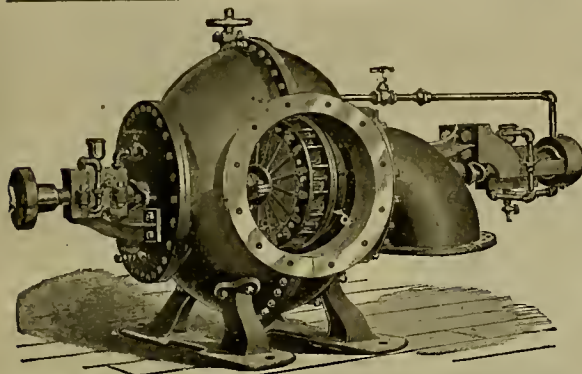
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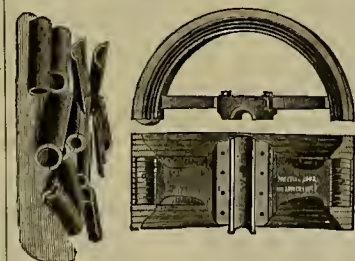
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Ores worked by any Process.  
Ores Sampled.  
Assaying in all its Branches.  
Analyses of Ores, Minerals, Waters, etc.  
Working Tests (practical) Made.  
Plans and Specifications furnished for the most suitable Process for Working Ores.

Special attention paid to Examinations of Mines; Plans and Reports furnished.

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(Formerly Hahn & Lookhardt,

Mining Engineers and Metallurgists.

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Assaying and Analysis of Ores, Minerals and Waters. Mines Examined and Reported on. Practical Instruction given. Treating Ores by improved processes.

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## The Late General Master Mechanic of the S. P. R. R.

(Continued from page 137.)

engine slide-valve. The improved anti-compression valves were simply long pieces of iron or other metal combined with their valve-seats and stems; relief-valves combined with their respective cages and steam-passages; and a wedge-shaped metal ring placed in the cavity around the top of the rim.

In 1869 Mr. Stevens turned his attention for a time to steam plowing, and on August 10th secured Patent No. 93,494 for a steam-cultivator. The patent was for a revolving plow-cylinder having the plows secured therein and adjustable on the pedestals, and the system of gearing transmitting motion between the engines, the plow-cylinder and the driving wheels in combination therewith.

The first piston packing invented by Mr. Stevens was patented March 7, 1865, No. 46,723. This invention consists in the use of a T-shaped and two L-shaped rings in combination with the head and follower of a steam piston in such a manner that the three rings are held in position by each other and by the piston-head and follower; and the L-shaped rings project up over the outer edges of the head and follower, and flush with the outer surfaces of the same, for the purpose of securing an increased surface between the packing rings and the cylinder.

A slide-valve was also invented by him and patented July 7, 1863, No. 39,181. The improvement was to prevent the pressure of steam in the cylinder on the exhaust side of the piston, after the port has been closed by the cap of the valve on the inside, and consists of the sub-titulation for a single anti-compression valve of the sliding kind, of two poppet valves operated upon directly by the steam. It also consists in protecting the back of the main valve from the pressure of the steam, and providing communication between the anti compression valve chest and the atmosphere by means of a follower and gland above the said chest.

As far as we have been able to learn, the first patent obtained for any of his inventions by Mr. Stevens was June 18, 1861, when patent No. 32,589 was issued to him for a slide-valve for steam engines. In this patent the "anti-compression" valve is inclosed by the chest which is bolted back of the main valve and consists of a flat plate having two ports of a width equal to that of the upper ports of the passages, but so much nearer to each other than the latter ports that when one of the two is opened by the corresponding port of the valve the other is closed by the valve. Secured to the top of the valve-chest is a counter pressure plate, which is attached to the said valve-chest and consequently to the main valve by a tube which screws into the chest and serves as a means of communication between the valve-chest and the atmosphere or exhaust pipe. By means of a bell-crank lever the anti-compression valve derives such a movement as to open and close the upper ports of the passages alternately at the proper time to permit the exhaust to be continued through these passages and through the chest and tube after either cylinder-port has been closed to the main exhaust-port by the main valve.

Of course, in the space at disposal, it would be impossible to give more than a mere idea of the nature of these mechanical inventions of Mr. Stevens. A summarized list will be interesting to his friends, in addition to such details as we have presented. The list of patents granted by the Government to Mr. Stevens is as follows:

Name of Patent.	No. of Pat.	Date.
Balance Slide Valve.....	357,424	Feb. 8, 1887
Apparatus for Mining Petroleum.....	348,790	Se. 1, 1886
Feedwater Purifier.....	331,917	Dec. 7, 1885
Feedwater Purifier.....	329,603	N. v. 3, 1885
Valve Gear for Steam Engines.....	324,964	Aug. 25, 1885
Hoisting Crane.....	305,248	Sept. 16, 1884
Valve Gear.....	288,133	Nov. 6, 1883
Steam Steering Apparatus (re-issue).....	9,990	Dec. 27, 1881
Feedwater Heater.....	240,137	Apr. 12, 1881
Friction Brake for Steering App't's.....	239,877	Apr. 5, 1881
Steam Steering Apparatus.....	231,905	Aug. 24, 1880
Steam Steering Apparatus.....	230,079	July 13, 1880
Steam-moved Valve.....	181,370	Aug. 22, 1876
Flue and Tubular Boiler.....	180,956	Aug. 8, 1876
Balance Slide Valve.....	154,529	Aug. 25, 1874
Vacuum Relief-valve for Cylinder.....	146,617	Jan. 20, 1874
Locomotive Furnace.....	145,813	Dec. 23, 1873
Locomotive Furnace.....	111,884	Feb. 14, 1871
Slide Valve.....	100,814	Feb. 16, 1870
Steam Cultivator.....	93,494	Aug. 10, 1869
Piston Packing.....	46,723	Mar. 6, 1865
Slide Valve.....	39,181	July 7, 1863
Slide Valve.....	32,589	June 18, 1861

Aside from these patented inventions, Mr. Stevens introduced many improvements and made many experiments for the more practical working of the mechanical departments over which he presided. He was, as may be imagined, a very practical man. He built the first locomotive and the first coal-burning locomotive in this State. All the machinery of the largest ferryboat in the world—the Solano—was selected and placed by him. He also designed and built the machinery in the ferry-steamer Piedmont, the inclined engine being low down so as to leave a clear

upper cabin. He designed and constructed a number of pumps, large and small, but patented none of his designs. The machinery for the new boats Apache and Modoc was built by him. The locomotives and engines designed by him are unique and economical, being admirably adapted for their special work. Among these are the engines on the Oakland local road and the El Gobernador, one of the largest locomotives in the world, designed for the Tehachapi Mountain division. It was through Mr. Stevens that the rolling-mill plant was built at Sacramento and the immense shops there much enlarged, and all the engines there were designed by him. The hydraulic system of cranes and elevators in the foundry and machine-shops at Sacramento are of his construction. He also designed the largest steam-hammer at the railroad shops; the spike-machines used there; the safety revolving switch stand used by the Southern Pacific Company; the machinery for handling the heavy aprons at the ferry-slips for the Solano's landing on Carquinez straits. Mr. Stevens was doubtless the leading designer and inventor of mechanical appliances on the Pacific Coast.

Mr. Stevens' son Fred naturally took to the pursuits which his father had followed. For a number of years he "fired" on a locomotive on the road of the Central Pacific, and was in time promoted to be an engineer, a position he held for some years. He is now acting as Division Master Mechanic with headquarters at Dunsmuir, in the Shasta region. He is a bright, intelligent young man, now receiving practical knowledge of rail-roading in all its branches.

### A TRIBUTE.

THE ILLUSTRATED PACIFIC STATES will issue in a few days a 20-page number containing a portrait of the late A. J. Stevens, General Master Mechanic of the S. P. R. R., together with illustrations of some of his inventions and of the floral offerings made by his associates for his funeral. With this will be a sketch of his life and a detailed account of his many inventions. Some 15,000 copies of this edition will be printed. A great deal of care has been taken in the preparation of this matter, which cannot fail to interest the late Mr. Stevens' many friends. The number is such a specimen of California illustrated newspapers that those who are not familiar with the paper would do well to inclose 10 cents for a sample copy to the Illustrated Publishing Co., 220 Market St., San Francisco.

### Mining Share Market.

The mining share market still continues active. As the Virginia Enterprise says, "Neither ore developments nor hullion shipments seem to have power to lift stocks out of the rut into which they have fallen. It appears to be impossible to get up even a boomlet, and such a thing as an all-time boom is not thought of. The active and courageous dealers of former years seem now to be quite out of the ring. In their stead we have a set of half-and-half, milk-and-water operators, to whom a two-bit rise seems a 'good killing,' and a rise of four bits means affluence. The Stock Board now fiddles to small dancers—a lot of little wooden men pulled by strings."

"The leading mines are all looking well and yielding largely and regularly. Ore is in sight in more different mines at the present time than ever before in the history of the Comstock. Quite a number of mines now have ore that have not yet succeeded in obtaining milling facilities, but the opportunities for getting ore worked will presently be better. The outside mills are now starting up; the Alta mill will soon resume operations, and it will not be long before the whole 40 stamps of the Chollar water-mill will be in operation. They yesterday began the work of laying a second line of water pipes from this tank on the side of Mount Davidson to the mill. When this pipe is in place two nozzles will be brought to bear on the Pelton wheel which has thus far driven half the machinery of the mill. It is expected that this one wheel will readily drive the whole of the machinery of the mill."

### Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Savage, Feb. 27, \$9500; Standard, 27, \$12,891; Grand Prize, 27, \$29,000; North Belle Isle, 27, \$18,000; Con. California and Virginia, 25, \$101,969; Pollock, 28, \$7872; Silver Bow, 28, \$13,344; Bluebird, 28, \$38,016; Lexington, 28, \$24,000; Germania, 21, \$1630; Hanauer, 21, \$4375; Queen of the Hills, 21, \$21250; Hanauer, 26, \$2250; Germania, 22, \$1596; Hanauer, 25, \$4440; Crescent, 26, \$3350; Hanauer, 26, \$2300; Germania, 26, \$1580; Queen of the Hills, 26, \$1263.

LARGE repair shops are to be built at Los Angeles by the S. P. R. R. Co.

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COMPANY.	LOCATION.	No. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Alpha Con M Co.	Nevada.	1.	25, Jan 9, Feb 15.	Mar 6, C. E. Elliott.	363 Montgomery St
Andes M Co.	Nevada.	5.	05, Feb 28, Apr 21.	Apr 27, J. M. Quay.	406 Montgomery St
Alaska M Co.	California.	7.	10, 03, Feb 21, Mar 26.	Apr 18, A. Judson.	320 Sansome St
Best & Belcher M Co.	Nevada.	39.	50, Jan 4, Feb 9.	Mar 2, L. Osborn.	308 Montgomery St
Bodie Con M Co.	California.	8.	50, Feb 13, Mar 20.	Apr 26, G. W. Sessions.	308 Montgomery St
Bohler M Co.	Nevada.	24.	10, Dec 5, Jan 10.	Jan 31, G. E. Elliott.	308 Montgomery St
Comet Con M Co.	California.	4.	3, 00, Jan 6, Feb 17.	Mar 14, H. Lacy.	321 California St
Champion M Co.	California.	23.	10, Feb 14, Mar 19.	Apr 14, T. Wetzel.	522 Montgomery St
Crocker M Co.	Arizona.	5.	25, Feb 15, Mar 27.	May 1, A. Waterman.	363 Montgomery St
Alvares Blue C M Co.	California.	1.	10, Feb 23, Mar 19.	Apr 9, B. Waters.	308 Montgomery St
Day R M Co.	Nevada.	15.	1, 00, Feb 8, Apr 9.	Nov 7, R. R. Grayson.	37 Fine St
Eva Con M Co.	Nevada.	1.	15, Jan 5, Feb 10.	Mar 5, J. Stadfield Jr.	304 Montgomery St
Exchequer M Co.	Nevada.	25.	20, Feb 7, Mar 17.	Apr 4, C. E. Elliott.	339 California St
Equitable Tunnel Co.	Utah.	33.	15, Feb 14, Mar 30.	May 9, C. J. Collins.	1018 Market St
Flowers M Co.	Nevada.	5.	10, Jan 13, Feb 17.	Mar 9, L. P. Holden.	113 Ledesda St
Found Treasure M Co.	Nevada.	2.	06, Jan 31, Mar 9.	Mar 23, J. Stadfield Jr.	413 California St
Gray Eagle M Co.	California.	1.	14, Jan 4, Feb 10.	Mar 3, T. Wetzel.	522 Montgomery St
Genesee M Co.	Nevada.	1.	30, Jan 10, Feb 14.	Mar 6, E. F. Stoue.	306 Pine St
Golda Fleese C M Co.	California.	12.	7, 00, Jan 23, Mar 15.	Apr 10, W. J. Gleason.	310 Phelan Building
Heath M Co.	Idaho.	3.	10, Feb 14, Mar 17.	Mar 9, L. P. Holden.	113 Ledesda St
Keyes S M Co.	Nevada.	1.	20, Feb 15, Mar 20.	Apr 16, H. Deas.	309 Montgomery St
Kennedy M Co.	California.	3.	10, Feb 20, Apr 2.	Apr 23, L. F. Reichling.	404 Montgomery St
Live Oak Drift C M Co.	California.	3.	10, Feb 13, Mar 20.	Apr 11, T. Wetzel.	522 Montgomery St
Mayflower G M Co.	California.	40.	50, Jan 19, Feb 23.	Mar 16, L. Monzolo.	328 Montgomery St
Mayflower G M Co.	Nevada.	13.	10, Feb 14, Mar 17.	Mar 9, L. P. Holden.	308 Montgomery St
Maubattan M Co.	Nevada.	7.	1, 00, Dec 9, Jan 12.	Jan 31, J. Crockett.	327 Pine St
North Bonanza M Co.	Nevada.	8.	15, Jan 10, Feb 15.	Mar 14, J. J. Scoville.	209 Montgomery St
Nevado M Co.	Nevada.	18.	35, Jan 10, Feb 14.	Mar 6, J. W. Pew.	310 Pine St
Paradise Valley M Co.	California.	4.	10, Jan 23, Mar 1.	Mar 23, W. L. Oliver.	328 Montgomery St
Pittsburg M Co.	California.	1.	10, Feb 14, Mar 17.	Mar 9, L. P. Holden.	113 Ledesda St
Quartz Mt G M Co.	California.	20.	70, Jan 17, Feb 20.	Mar 15, E. Hestres.	217 Sansome St
Spring Valley G M Co.	California.	2.	50, Jan 11, Feb 18.	Mar 18, H. P. Hichor.	320 Sansome St
S F Copper Co.	Nevada.	2.	41, Feb 3, Mar 10.	Apr 3, H. P. Hichor.	329 Sansome St
Virginia Creek Hyd M Co.	California.	5.	05, Feb 28, Apr 4.	May 1, J. M. Quay.	466 Montgomery St

### MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING.	DATE.
Cover M & M Co.	California.	M. T. Ashby.	402 Front St.	Annual.	Mar 14
Hale & Norcross M Co.	Nevada.	J. F. Lightner.	308 Montgomery St.	Annual.	Mar 14
Nye M Co.	Nevada.	W. J. Dooly.	405 California St.	Annual.	Mar 21
Potosi M Co.	Nevada.	C. E. Elliott.	308 Montgomery St.	Annual.	Mar 14
Sutro Tunnel Co.	Nevada.	P. W. Ames.	320 Sansome St.	Annual.	Mar 5

### LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE.
Con California & Va M Co.	Nevada.	A. W. Havens.	308 Montgomery St.	50.	Feb 10
Eureka Con M Co.	Nevada.	H. R. P. Hutton.	306 Pine St.	25.	Feb 3
North Belle Isle M Co.	Nevada.	J. W. Pew.	310 Pine St.	50.	Feb 2
Russell Rockwell & M Co.	Nevada.	J. W. Pew.	328 Montgomery St.	50.	Sept 17
San Francisco Copper M Co.	California.	F. E. Beric.	320 Sansome St.	05.	Sept 19
Standard Con M Co.	California.	J. W. Pew.	310 Pine St.	05.	Jun 12

### Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Feb. 9.	WEEK ENDING Feb. 16.	WEEK ENDING Feb. 23.	WEEK ENDING Mar. 1.
Alpha.....	1.85	2.15	2.15	2.35
Andes.....	2.15	2.20	2.20	2.40
Alaska.....	1.40	1.55	1.50	1.55
Argenta.....	.20	.20	.20	.15
Belcher.....	.75	.75	.70	.52
Brophy.....	.65	.65	.65	.55
Best & Belcher.....	.65	.70	.70	.60
Bullion.....	1.65	1.80	1.70	1.80
Baltimore.....	.95	1.00	1.05	1.20
Belle Isle.....	.70	.75	.70	.65
Bodie Con.....	2.30	2.90	2.15	2.30
Bodie.....	2.75	3.00	4.40	5.50
Bodie Tunnel.....	.35	1.00	.85	.85
Bulwer.....	.16	.19	.17	.15
Con. Va. & Cal.....	4.90	6.00	6.75	6.90
Challenge.....	.65	6.50	6.10	6.25
Champion.....	.65	6.50	6.10	6.25
Chollar.....	.23	.28	.27	.30
Confidence.....	.30	3.25	3.00	3.10
Con. Imperial.....	.55	.60	.55	.50
Caledonia.....	.70	.75	.70	.65
Con. Pacific.....	.70	.75	.70	.65
Orovan Point.....	.80	.85	.80	.75
Crocker.....	.80	.85	.80	.75
Central.....	.80	.85	.80	.75
Dudley.....	.80	.85	.80	.75
East B. & B.....	.80	.85	.80	.75
Eureka Con.....	.11	.15	.12	.14
Exchange.....	1.10	1.35	1.20	1.30
Grand Prize.....	2.05	2.15	2.00	2.15
Gould & Curry.....	5.20	6.00	5.10	5.40
Hale & Norcross.....	9.50	10.90	10.10	10.20
Holmes.....	.50	.50	.50	.50
Independence.....	.50	.50	.50	.50
Iowa.....	.45	.45	.45	.45
Justice.....	1.00	1.00	1.05	1.10
Kentuck.....	2.30	2.50	2.25	2.50
Lady Wash.....	.40	.45	.45	.50
Martin White.....	2.15	2.40	1.85	1.90
Mono.....	4.80	5.20	4.95	5.50
Mexican.....	4.80	5.20	4.95	5.50
Mt. Diablo.....	4.75	5.00	4.75	5.00
Northern Belle.....	1.00	1.20	1.10	1.20
Navajo.....	1.45	1.60	1.50	1.75
North Belle.....	7.15	7.75	7.50	7.75
Ning ran.....	3.10	3.70	3.50	3.80
Nev. Queen.....	1.65	1.80	1.70	1.85
North G. & O.....	.95	1.20	1.10	1.25
Occidental.....	.90	1.20	1.10	1.25
Ophir.....	.25	.25	.25	.25
Overman.....	2.15	2.40	2.30	2.50
Potosi.....	.51	6.50	5.75	6.00
Peerless.....	1.35	1.65	1.35	1.40
Pe. F.....	.70	.70	.70	.70
P. F.....	.70	.70	.70	.70
Silver Star.....	.75	7.50	7.25	7.50
Savage.....	.80	.85	.80	.75
Seg. Belcher.....	.51	.55	.55	.55
Sierra Nevada.....	.45	.50	.45	.50
Silver Hill.....	.45	.50	.45	.50
Silver King.....	.80	.85	.80	.75
Scorpion.....	.80	.85	.80	.75
Syndicate.....	4.85	5.25	5.10	5.40
Union Con.....	1.55	2.25	2.00	2.10
Utah.....	8.50	9.50	9.10	9.25
Yellow Jacket.....	8.50	9.50	9.10	9.25

### Sales at San Francisco Stock Exchange.

WEDNESDAY Feb. 23.	350	Gould & Curry.....	4.40
200 Alta.....	2.15	200 Grand Prize.....	2.00
300 Andes.....	1.20	500 Hale & Nor.....	.95
1550 Alpha.....	.55	100 Julia.....	.45
130 Andes & Belcher.....	.55	500 Justice.....	1.05
150 Belcher.....	.55	200 Lady Wash.....	.50
200 Bodie.....	.25	200 Mexican.....	.65
2700 Baltimore.....	1.75	500 Nev. Queen.....	.30
1310 Bullion.....	1.80	100 Ophir.....	1.04
100 Caledonia.....	.60	500 Overman.....	2.50
790 Chollar.....	.55	300 Potom.....	.50
685 Con Va & Cal.....	1.10	200 Peerless.....	1.30
1045 Challenge.....	1.00	180 Savage.....	.61
100 Crocker.....	.45	500 Sierra Nevada.....	.40
1000 Caledonia.....	.60	100 Syndicate.....	.50
525 Con. Imperial.....	.60	500 Silver Hill.....	.40
165 Confidence.....	.46	260 Union Con.....	.40
101 Crown Point.....	6.75	400 Utah.....	1.85
1500 Exchequer.....	1.40	650 Yellow Jacket.....	9.50

### New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

**COSTA RICA EXPLORATION Co.**, Feb. 27. Object, to acquire mineral lands in Central America. Directors—E. C. de Sahla, Jr., E. A. Denicke, C. K. Bonestell, J. Frownsfelt and E. O. Gaestner.

**AMERICAN PATENT DRILL AND REAMER Co.**, Feb. 27. Object, to sell patents for sinking artesian wells. Directors—I. H. Rus, C. M. Oakley, C. O. Lang, J. G. Huss and W. C. Chapman.

**DEL MAR & SAN DIEGO R. R. Co.**, Feb. 27. Object, to construct a railroad from the town of Del Mar to San Diego by way of La Jolla, Pacific Beach and Ocean Beach. Directors—Geo. K. Porter, F. C. Siehe, Alexander Innis, W. H. Carlson and F. J. Higgins.

**LACHMAN CALIFORNIA WINE Co.**, Feb. 23. Capital stock, \$1,250,000. Directors—Samuel Lachman, Albert Lachman, Henry Lachman, Leo Metzger, and Hamilton W. Crahn.

**MARINER'S SAFETY COMPASS Co.**, Feb. 29. Capital stock, \$1,000,000. Directors—Lewis R. Mead, George W. Arnold, Daniel Titns, Neil C. Whitys and Joseph A. Sladky.

**PACIFIC ENDOWMENT AND IMPROVEMENT ASSOCIATION**, Feb. 29. Capital stock, \$2,000,000. Object, securing in California, Mexico and Central American States patents for the endowment and management of schools, academies, art galleries and hospitals; also to engage in commercial pursuits and mining. Directors—A. M. and J. H. Loryea, E. Wolfe, E. Sloman



List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co. a Patent Office Library, 20 Market St., S. F.

FOR WEEK ENDING FEBRUARY 21, 1888.

- 378,351.—SASH-FASTENER—J. D. Axtell, Santa Barbara, Cal.  
378,192.—POWER MECHANISM—Geo. Cottrell, S. F.  
378,091.—REVOLVER—Aug. Greth, S. F.  
378,066.—SMOKE-CONSUMING FURNACE—John Keane, S. F.  
378,371.—ORE-FEEDER—E. C. Loftus, Oakland, Cal.  
378,344.—CONVERTING MOTION—J. H. Pemberton, Los Angeles, Cal.  
378,262.—THRILL COUPLING—J. W. Pendleton, Greenville, Cal.  
378,215.—BRAKE BLOCK—G. A. Posson, Angwin, Cal.  
378,221.—PROPELLER WHEEL—W. L. Strong, S. F.  
378,345.—CARD EXHIBITOR—W. D. Valentine, S. F.  
378,270.—CARD EXHIBITOR—Valentine & Bailey, S. F.  
378,155.—LEVER-POWER ENGINE—E. T. Wheel, Oakdale, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**CARD EXHIBITOR.**—Walter D. Valentine, S. F. No. 378,345. Dated Feb. 21, 1888. This invention relates to that class of machines for exhibiting cards in which the cards are contained in a hollow column or tube, and are successively forced out by a slide into a holder, said holder having a movement by which it is placed in position to receive the card, and, after exposing, to discharge it. The invention consists in the novel pushing-slide and attached card-support, and the mechanism for operating the slide, the movable card-holder and the mechanism for operating it, an alarm apparatus, and a governing device for controlling the operation of the machine.

**POWER MECHANISM.**—George Cottrell, S. F. No. 378,192. Dated Feb. 21, 1888. This invention relates to that class of power mechanism employing differential gears, and in which an eccentric operates upon a swaying toothed disk which engages with a gear having a different number of teeth, whereby the power transmitted to said gear is a differential one. The general object of this invention is to provide a differential power mechanism which is applicable to all machines which require the rotation of an inner part by means of power applied primarily to an outer part, such, for example, as capstans and presses. The particular object is to provide a suitable power mechanism for a wine or cider press, which is adapted to vary its power to conform to the demands of the work.

**PROPELLER WHEEL.**—Walter L. Strong, S. F. No. 378,221. Dated Feb. 21, 1888. This improvement to screw propellers consists of spirally formed blades or vanes extending radially outward from the hub, which is to be attached to the propeller shaft, and in combination therewith of an exterior hood or ring cast with or secured to the edges of the propeller blades and inclosing the front edges of the propeller blades, while the rear ends are allowed to project beyond and behind this ring. The hub, forming a part of the propeller and rotating with it, holds the water and prevents it from being thrown outward by the rapid revolution of the propeller, and thus gives it a strong hold on the water, keeping the latter also a solid body and preventing its being churned up, and also serving to give it an impulse directly back and in the line of travel of the boat. By leaving the rear portion of the propeller blades uncovered it allows the water to escape freely and discharge from the propeller without choking.

**CARD EXHIBITOR.**—Walter D. Valentine, S. F., and H. S. Bailey, Denver (said Bailey assignor to said Valentine). No. 378,270. Dated Feb. 21, 1888. The invention relates to that class of machines for exhibiting advertising and other cards. It consists in a vertical tube or hollow column for receiving and confining the cards, the tube or column having exit-apertures on the base of its sides, a reciprocating follower moving under the tube or column and having a cross-piece adapted to come in contact with the edge of the lowermost card on each stroke, whereby it forces one card out one side and the next card out the other side, vibrating card-holders operating on each side of the tube or column, and adapted to receive a card when in a horizontal position, and to move to a vertical position to exhibit it, and a periodically moving mechanism by which the several parts are operated. The object is to provide an effective card exhibitor which will operate automatically and at such stated or regular intervals as will permit inspection of the exposed cards before they are turned down to make place for others. This invention is a very ingenious one.

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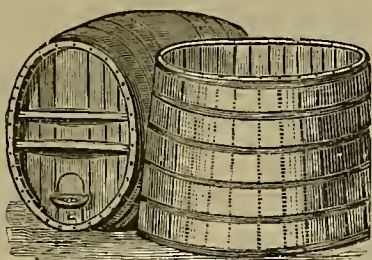
**CONTENTS.**—PART I. MINING MINERALOGY, AND ECONOMIC TREATMENT AND HISTORY OF THE USEFUL MINERALS. Mining Mineralogy, Preliminary Principles and Preparations, Economic Treatment and History of the Useful Minerals, Gold, Silver, Copper, Nickel, Iron, Tin, Zinc, Lead, Manganese, Platinum, Iridium, Mercury, Antimony, Bismuth, Chromium, Cobalt, Corundum and Emery, Pumice Stone, Infusorial Earth, Griststones, Bihrtones, the Diamond.  
PART II. MINING WORK AND ARCHITECTURE, INCLUDING VARIOUS SUGGESTIONS, WITH DESCRIPTION OF ASSOCIATED APPARATUS AND MACHINERY. Mining Construction and Machinery. [This part comprises 99 pages, illustrated by 165 engravings, with details too full to be comprised within the limits of this advertisement.]  
Appendix. Sinking Artesian Wells, Oil and Gas Wells, Index.

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MEETING NOTICE.  
Gover Mining and Milling Company.

A meeting of the Stockholders of the above-named Company will be held at the Company's office 492 Front Street, room 8, San Francisco, California, on Wednesday, March 14, 1888, at 1 o'clock P. M., for the election of officers and the transaction of such other business as may legally be brought before it. By order of the Board of Directors. MARK T. ASHBY, Secy.

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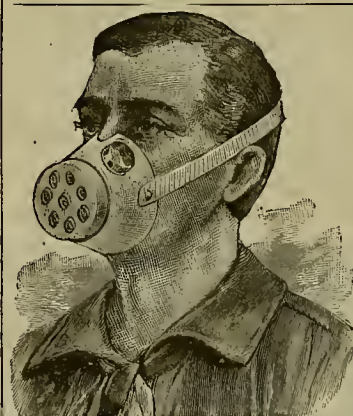
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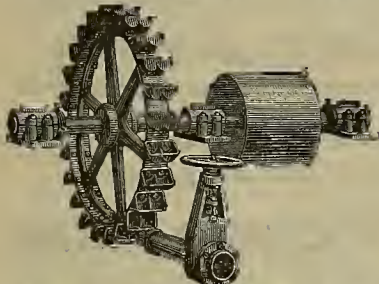
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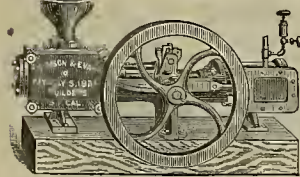
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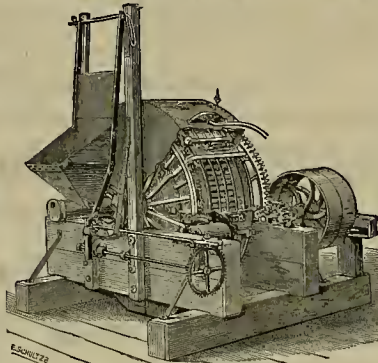
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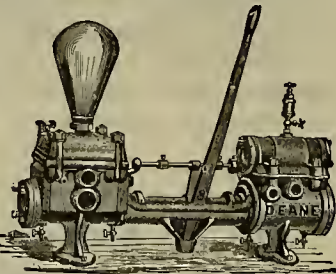
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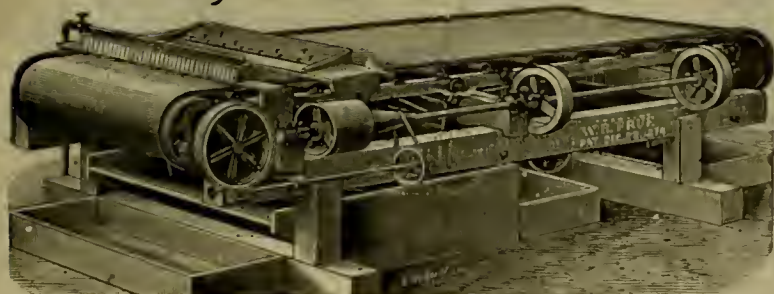
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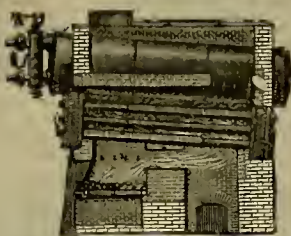
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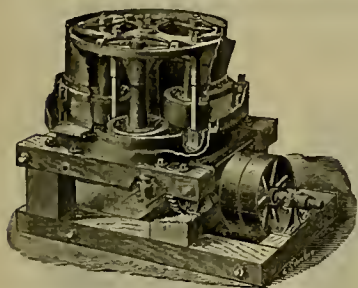
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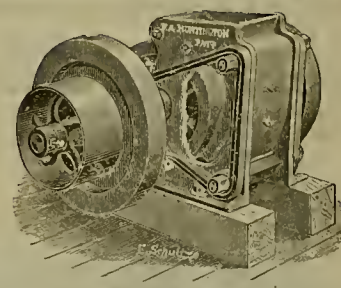


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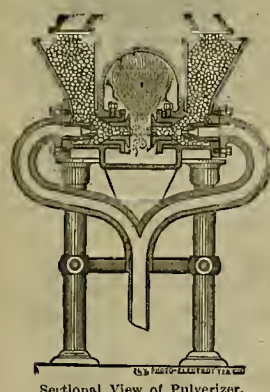
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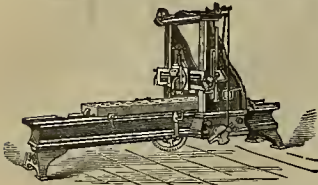
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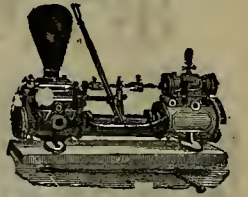


Putnam Planer.

# PARKE & LACY.

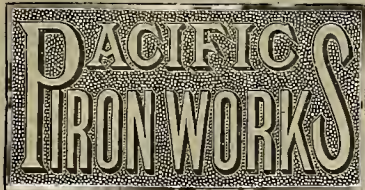
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California Cotton Mills, East Oakland	1 150 H. P.	Selby Smelting Works, Vallejo Junction	1 75 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
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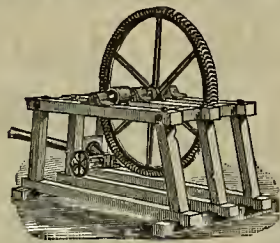
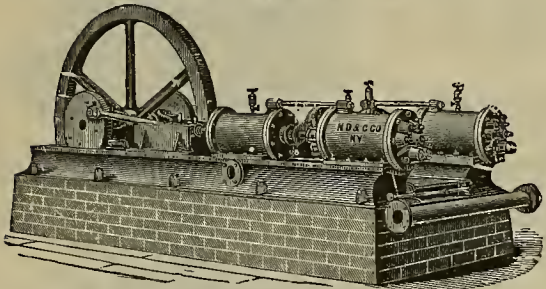
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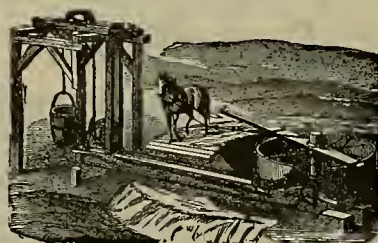
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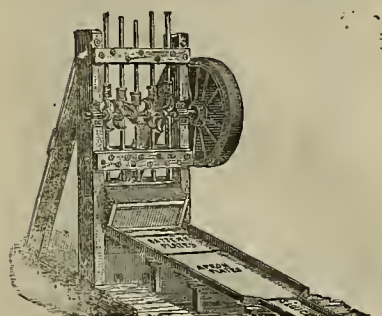
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An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MARCH 10, 1888.

VOLUME LV  
Number 10.

## Soderling's Amalgamating Pan.

In the ordinary construction of amalgamating pans, it is customary to grind the material in the pan by means of mullers rotating above fixed dies, and between which and the mullers the material is caused to pass, so that the two opposing surfaces will grind and reduce it, in the presence of mercury and chemicals, which assist in saving the precious metals. Mr. August Soderling of Bodie, Mono county, has patented a pan in which it is possible to cause the material itself to act as a grinder upon other parts of the material; and the pan has been constructed by Mr. Isberg with special reference to the production of counter-currents.

Fig. 1 of the engraving shows a pan having a steam bottom and a muller with grinding shoes. Projecting wings are placed on the inner muller, as shown. The muller has a cone extending upward above the central cone of the pan, and is driven by a hollow shaft which extends up through the central cone and has a feather or key by which it is connected with the muller, so that the two will move together. This hollow shaft is driven by a beveled gear-wheel, which is engaged by a pinion on the horizontal power shaft.

Another shaft extends up through the hollow shaft, and has a gear wheel at its lower end engaging with a pinion on the power shaft, this one horizontal shaft serving to drive the two vertical shafts in opposite directions by means of the gears as shown. The upper end of the inner solid shaft has a feather which engages a corresponding keyway in the upper end of the cone of the outside ring shown in Fig. 2. This cone extends down outside of the inner one which connects with the muller, corresponding with it in shape, and it is connected with the isolated ring shown in section in Fig. 1, and in perspective in Fig. 2, this ring being driven by it in an opposite direction from that of the muller.

The slots in this ring are preferably made angular as shown, and the sides of the slots are curved so that when rotating the tendency will be to carry the material from the outside of the pan through the slots and throw it toward the center by the centripetal force, when it will come in contact with the oppositely moving current which is thrown outward centrifugally by the inner muller, and its wings moving in the opposite direction.

This action produces two lateral currents coming in contact with each other, and causes the harder and softer portions composing the pulp to erode or disintegrate each other, thus releasing any precious metals which may be still contained therein. The mercury which has become floured by grinding and the whole mass of material will be acted on by the chemicals employed during the process.

The pan with the steam-bottom muller and driving gear is similar to those used in the ordinary grinding pans, but the isolated ring rotating in the opposite direction from the muller and without contact with it or any other portion of the pan produces an action which Mr. Soderling is confident is much more efficacious than can be accomplished by any amount of grinding. The time is no greater than that occupied in the ordinary grinding, and the extra power is only that necessary to run the isolated ring, which may be given more or less speed by altering the relative sizes of the gear wheels. The blades in the rings may be cast at any angle de-

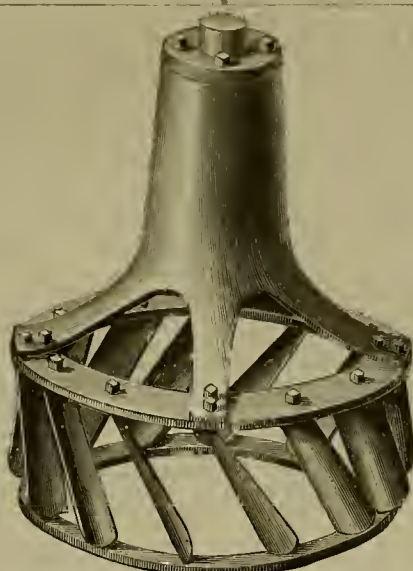


Fig. 2.—SLOTTED RING OR SUPPLEMENTAL MULLER.

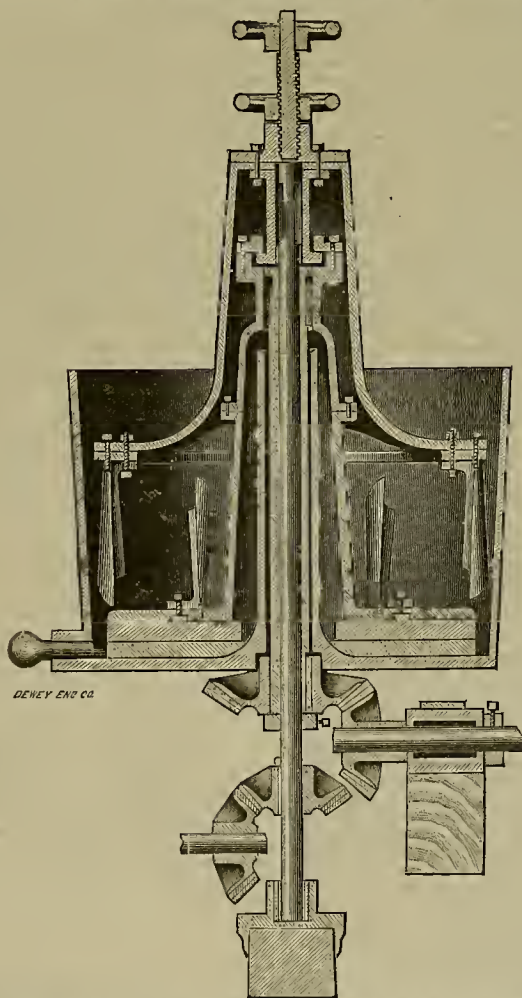


Fig. 1.—SECTIONAL VIEW OF SODERLING'S AMALGAMATING PAN.

sired according to the work to be accomplished. In some rings the blades are cast at quite an angle to cut the current; in other cases they are set straight to drag in the current.

Mr. Soderling informs us that his experi-

ments show that with an ordinary muller pan, slimes without the addition of sand will yield only about 15 per cent of the precious metals contained in them, but by the addition of the slotted ring to the pan the yield increases to about 70 per cent. By the use of this device friction is avoided which would be necessary if more grinding surfaces were employed. The effective action is claimed to be greater inasmuch as the striking points of the opposing currents are acting all the way round the pan, and so far from the center as to be in operation about one-third of the radius of the pan from the edge. Slimes, sands, ores and tailings of low grade can be worked with this appliance.

Fig. 3 on page 153 shows how the new muller or ring can be added to any ordinary pan, and be rotated from the top. The ring or supplemental muller is also shown in this cut. This forms simply a modification of the ordinary pan.

In amalgamating pans hitherto constructed to form currents, Mr. Soderling says the mullers had to revolve at too great speed for desired effect. When larger pans were desired for economy, the ratio of effectiveness of impact action was very difficult to obtain in the same proportion, as the cubic contents of the pan had to be increased. In this new device these difficulties are obviated. The isolated slotted ring or muller gives impact and opposing currents all around the pan and does as good work in a large as in a small pan, the ratio of contact increasing as the cubic contents increase. This fact is very important, as amalgamation can be effected more quickly and an increased yield of the precious metals results. Mr. Soderling says he has already proven this by experiments made on low-grade tailings that previously could not be worked with profit, but are now, in Bodie, paying well when worked in this pan. After practical work there, Mr. Soderling states that this new pan can be run at one-fourth the cost of the old pan. In 2½ hours' run he is enabled to obtain between 60 and 70 per cent of contents, while in running the old-style pan five hours he can only obtain 30 to 40 per cent. Tailings can be worked in large quantities in this pan. Correspondence is solicited with parties having large tailings deposits anywhere on this coast. The owners of this patent are A. Soderling, Bodie, M. Isberg, 214½ Clara street, San Francisco, and C. E. Bagge, Oakland.

A MINING engineer of this city was recently in the mountains on a business trip, and while talking with some miners in a cabin one evening the conversation turned on a well-known mining man who died a few years since. "Old Gash," as he was called by his familiars, has had many a story told on him. After several reminiscences one of the miners said: "Well, poor old fellow, I guess he's milling free gold in heaven now." "I dunno," said another, "perhaps he's taken to smelting!"

DID KNOW IT WAS LOADED.—The last miner to put in a "shot" and knew it was loaded, but went back to see why the blast did not go off, was Louis Gilmore of the Sam Slick mine, Chewawis district, Washington Territory. His companion, Frank Henshaw, who went back too, was so badly hurt that he could not attend Gilmore's funeral.

QUICKSILVER has fallen a little in prices, being now quoted at \$38.50 to \$40 per flask. Receipts of quicksilver thus far this year amount to 3913 flasks, against 4515 during the same period in 1887; while the exports have been 1837 flasks, against 3174 in the same time last year.



## CORRESPONDENCE.

We admit, unindorsed, opinions of correspondents.—JDS.

## A Trip to the Los Burros Mines.

[From Our Own Correspondent.]

There are hundreds and thousands coming to this beautiful State who rush through it in the railroad car or stay at the well-known pleasure resorts beautified by art only, and never see California as it is. These people then go home, and when they did not find the same comfort they are used to in their residences on Beacon street or on the Hudson, they grumble at the exaggerations of the beauties of this country. How seldom do we find here a traveler who can boast of mountain climbing simply to see the grand mountain scenery. The Englishman traveling in Switzerland is never without his guide-book, and examines nature carefully in reference to the correctness of his guide-book; and the American runs through the country and tries to see the most in the least possible time, so that it is said of one who had written to his father that he calculated to have been in Cologne, as he had seen a very large church the name of which he could not ascertain for want of time. Just so it seems to me sometimes when I hear people speak of California: "It took us only so many hours to see Yosemite, but that dreadful stage-riding, it broke me all up; they ought to build a railroad through it." Yes, and spoil nature! But I go astray somewhat. I was going to describe a little trip through a country wild and virgin, almost untouched by cultivation. I mean a trip through the Coast Range to the newly discovered gold mines in Monterey county. But first let me tell you that I am not a fond of hard work as I seem to be, as I was sent to make the trip and report of the mines. I will leave out my experience of railroad-riding, but invite you to mount the cart with me and off we go.

The way through the Salinas valley is charming, but known so well that I need say little about it. Kings City is one of the newly erected towns with its hotels, stores, etc., and a very obliging postmaster, and is so far contented to exist. As a matter of course there is no bridge over the river, and I could hardly get my horse through the quicksand. My horse is a tame mustang and would, I suppose, like it much better to sit herself in the cart than to drag me through the country. I do not blame her for it, and I hope only that in case the old Egyptians are right and our souls have to wander through the hodies of several animals, I am not bound to go in a newspaper agent's horse. It's a pretty hard life. After crossing the stream we travel through green fields and pastures until we pass the Spanish Grant and find the road lined with charming farm-houses, mostly of the Spanish style, surrounded by nice orchards and splendid oaks. Soon we enter the valley proper, the side hills of which are all heavily covered with oaks and chaparral. One farm-house more in a little cozy patch and we begin the gradual ascent of the foothill range, as you may call it, winding around the grade in an easy manner. As soon as we come to the summit we have a most charming view over the Salinas valley with its green fields and white farmhouses and far over to the range of the easy-rolling White Chalk mountains which form the line between Monterey and San Benito. The grade is some 1500 feet high and the air is already much lighter and more genial than in the warm valley. After passing the summit we go down to the Jolon Flat, a thickly settled fertile valley. The heat is less, of course, taken in by the large Spanish grants, but fortunately the *dolce-fur niente* liking Spaniard cannot any longer oppose the approach of the hard-working American, and the ranches are being sold now and divided up for settlement. The hills are covered partly with pine trees, partly with sagebrush, and in the valley thrive the oak. Soon Jolon is in sight and we take a last glance at the mountain beautified by the setting sun. Jolon is an old town, but did not grow too much; how it will do now no one can tell, especially if the mines should prove to be as valuable as they seem to be. I took lodging in one of the hotels, and next morning, after a good rest in the salubrious air, I provided myself with food for horse and man and set to traveling again. It was pretty warm, and, as a matter of course, I took the wrong way. I should not have done so, as they had expressly advised me to take the right way, and that was to be the most traveled one; but unfortunately my opinion differed in this respect and I took the way to the old Mission San Antonio.

San Antonio was founded in 1771 and was once a thriving place. It still has in its midst the ancient Mission church with its massive adobe walls, its roof of red-fluted Mexican tiles and its lofty campanile and enormous bells which now call the pious only every four weeks to service. There is a jail and different other buildings half in ruins, a substantial monument of the labors of the Franciscan friars. Extensive irrigation works speak further for the industry of the old padres.

I followed the road along a dashing creek through wild mountains, and after a ride of four miles was lucky enough to learn from a century-old Spanish senora (at least she looked that old) that the way to the mines lay some seven miles back. When I turned my horse it seemed cheerful, expecting to go home again.

The poor fellow was cheated this time. It was very comfortably warm in these mountains, and they said still it was a nice cool day with only 91° in the shade. After awhile I found the right road and passed the Antonio river. This stream, as well as the Nacimiento, empties into the Salinas river, running parallel to the latter in an opposite direction. The whole country is divided up in large Spanish grants, and they include some of the richest land and the loveliest valleys in this district. The latter are thinly covered with immense oak trees some four and five feet in diameter and covered with dark-green grass as beautiful as a garden lawn and watered here and there from small springs. The mountains or hills are smoothly rolling and also partly covered with these majestic trees. After some eight miles traveling through this charming country I landed safely at the foot of the wild mountain range and got ready for the ascent. My horse looked at the mountains and then watched me; it seemed to expect nothing good when I put the saddle on it and let it have some food. Some one had told me the trail was excellent and it would not take me over two hours to come to the mines. I found it a little different, as will be seen later. It was four o'clock when I mounted my horse and started up the mountain. The scenery began to be very romantic. Immense rocks had rolled down from the steep mountain-side and formed a wild chaos out of which, between the shrubbery, pines had forced their way to light and sunshine. Here the trail is sometimes very steep and engaged all my attention. It was very careful in going down the steep trail, and I, not being used to it very much either, had to leave the saddle several times. After an hour and a half we had reached a point where the trail turns around the mountain and I stopped to look at the beautiful panorama below me. There was the roaring Nacimiento river, which forced its way through a narrow valley or gulch opposed in every direction by those gigantic rocks. There lay stretched out the charming valleys with green carpets, and to the right and left the heavily timbered, smoothly rolling hills and picturesque mountains in the evening shadows, partly colored to a charming pink from the setting sun. I was sorry indeed to leave the picture, but the setting sun and the sense of hunger made me consider the advisability of getting to night quarters soon. My horse seemed to be very tired, and therefore I left the saddle and began to climb the trail on foot, dragging the horse behind me. It was hard work. Not only was the trail very steep, but the horse did not like to go fast at all, and neither good nor bad words had any effect. By this time the last vestige of daylight had vanished and the picture before my eyes was visible by star and moonlight alone, and what a moonlight it was! Not a shred of cloud hung in the sky, which was of the pure blue that one sometimes sees in the Alps. On all sides rose the dim mountains with forest dark and quaint, while from the gorges along their slopes and from the valley below came the low music of streams rushing downward. On I went, up and down, without visible end. It was already 8 o'clock, and I began to feel very hne about not reaching an inhabited place. The horse took revenge on me. I tried different ways to bring it to a faster step—for instance, by holding on to its tail, but this had the only effect to bring it to a complete standstill; yes, it even "laughed" at me when I had trouble to fasten the barley sack to the saddle. Sometimes I rested to listen to the concert of the frogs and locusts and the cries of the owls and coyotes, when these went through the quietness of the night. About 10 o'clock I was completely exhausted and sat down to consider my condition. I was sure I must have passed the mines and got on a wrong trail. The trail was there, but no end to it. Then suddenly I saw a light across the mountain from the direction I had come, and immediately began to hallo as loud as I could. A multiplied echo was the only answer. I got ready to go back, and had just started when I discovered that the light seemed to be raised, and watching it closely I found that a very bright star had played with my imagination. I went on, as the trail ought to have an end, but had difficulty in finding the way always, because thick shrubbery and large trees prevented the moonlight penetrating to it. About 11 o'clock I made another halt, and heard, to my pleasure, a well known sound, the roar of the ocean. I took new courage, let the horse eat, and stilled my hunger with some of the barley, and after a little while started anew. I had not made a quarter of a mile when I suddenly heard a welcome sound passing through the air. It was the regular tact of a stamp-mill, and not long after I landed safely in the camp. I had some difficulty in reaching the people, but after awhile the inn-keeper helped me to a night's lodging on the floor of a cabin, where I fell asleep right away and slept soundly until daylight.

Before continuing to relate my journey, I may as well say a few words about the mines. It was until lately thought impossible that gold could be found in the Coast Range in paying quantities, and the onion held good till April, 1887, when Mr. D. W. Cruickshank discovered a vein of very rich ore in the gulch where he was prospecting for placer gold. Since that time a great many other veins of gold and silver have been discovered, some paying as high as \$1100 a ton. The mines are situated on the west slope of the Coast Range at an elevation of 3500 feet above the sea level, four miles

east of the coast and 18 miles northwest of Jolon. The prospects are very encouraging, and I think it will be a very lively camp. From what I heard and saw during my visit, it appeared to me that the Los Burros mining district should become one of the noted camps of California. The Los Burros mines are situated 18 miles from Jolon and four miles from the ocean, on the western slope of the Coast Range, with comparatively easy access from both directions. They were discovered by Mr. W. D. Cruickshank, by tracing from the gulch where he had found free gold in the creek. The first vein he struck was a four-inch one and proved to be very rich, as 18 pounds of the ore yielded \$25. On the first vein discovered he sunk 22 feet. In this shaft are two veins, one being 8 inches, the other 16. Two other equally rich veins were found respectively 60 and 85 feet further north of the above mentioned. A tunnel on the upper vein is 100 feet long; the vein is traced 400 feet, some of the ore assaying \$250 per ton. The average width of the vein is 16 inches. At present Mr. Cruickshank has a three-stamp mill running day and night; this they propose to enlarge. They propose to run a tunnel some 350 feet to tap the vein at a depth of about 100 feet. No low-grade ore has been discovered in any of the veins. The mining district—that is, as far as prospected—is from 10 to 12 miles in extent, but it seems to include the whole western slope. Old miners have found placer gold in all directions in paying quantities, contrary to the opinion of the scientist, who considered the existence of the precious metals in this mountain range an impossibility—a triumph of practical experience over theory.

Among the various mines that are opened and prospect as good as the one described is the Manchester mine, named after old Captain Manchester, who is most positive that there are millions in it. He pounded out of one pound of ore \$1½ worth of gold. This mine is situated one-fourth mile below the Cruickshank and work will be commenced on it immediately. The Ajax mine is ½ miles southeast from the Cruickshank. It has a very rich ledge of antimonial silver, with gold. The principal vein averages two feet in width. There is a tunnel some 150 feet long, in which was struck immensely rich ore. Operations will be begun there soon. The Grand Pacific has a shaft 50 feet in depth. A contract has been let for running a tunnel of 300 feet. Some specimens of the ore yielded as high as \$1130 per ton.

A contract has been let on the Esmeralda, adjoining the Cruickshank, for 100 feet of tunnel, and one on the northeast extension of the Cruickshank for the same length.

There is a quantity of fine fir and redwood and an inexhaustible supply of water. There is a scarcity of good miners, and experienced men will find ready employment.

As to beauty of landscape, the place is certainly unexcelled. From the stamp-mill you look over a heavy-timbered gulch down to the broad ocean, which daily sends up a gentle breeze to temper the heat of the day, but keeps the fog in the valley below. After I had received all the information wanted, I put the saddle again on my horse and started on my way back. Never will I forget the unsurpassed scenery. After a half hour's ride I left the timber behind me and had before me a panorama bursting into view never seen before. You look down into a great pool of mountains, valleys and gulches, with running streams and verdant meadows, while the steep mountain-sides are covered with heavy redwood, the light Monterey pines and dark fir, and as a grand background you see the immense ocean, the roar of which you can plainly hear. Right before you is the Santa Lucia range, with the Santa Lucia some 6000 feet high and different other peaks, and all around the endless mountain ranges and peaks down to San Luis Obispo and over to San Benito. Above you the blue sky, contrasting wonderfully with the dark forests and reddish mountains. In the far distance you will observe a chain of white chalk mountains, reminding one much of the irregularities of the Alps. Over the ocean there is partly a light cover of white fog, but not so thick as to prevent one seeing the passing steamers and sailing craft. I was so delighted with my sojourn there that I could make up my mind with difficulty to leave that grand view of mountain scenery, which at this season of the year is most beautiful in its adornment of living green. But duty goes before pleasure and I had to leave. I am sorry to say that vandalism has already penetrated in this beautiful region and that foolish hands have set the shrubbery on fire and splendid forests are destroyed. When will America awake and protect its beauties and resources of wealth? After a few hours' ride I came to the descending point. Not long after I was again from where I started in the valley of the Nacimiento. Without further incident I landed safely in Jolon, where I enjoyed the good beds of the Tidball hotel immensely.

J. G. H. LAMPADUS.

W. R. ECKERT, the mechanical engineer, has gone to Virginia City for the purpose of changing the present system of wire-rope power transmission from the Pelton wheels to the C. and C. shaft, which operates the California battery mill. The object to be attained is to equalize the strain on the four lines of steel wire-rope to prevent them from stranding and breaking, as they frequently did under the old system. Mr. Eckert is confident he can overcome that defect, and expects to have the California mill-stamps in operation in April.

## Notes on Salvador.

[Written for the Press.]

One of the ways—in some cases the best way—of reaching Honduras is through the snug little Republic of Salvador, landing at the port of La Libertad at which the Panama steamers touch. The steamship company only contracts to carry passengers "to the anchorage" at any port, consequently the passenger must be prepared to pay the expense of landing himself and his baggage. How it would fare with the unfortunate who might lack the wherewithal to do this is a problem; I presume he would be marooned.

The port named is nothing more than an open roadstead, and at times it is not feasible to cast anchor there nor possible to land any person or thing. The inconvenience of landing in the surf is obviated by means of a long wharf supported by iron piles, and passengers and their baggage are carried thereto by the same lighters which take the freight from the ship, small boats being used only by the company's agent and the officials of the country. When there are lady passengers, a gangway chair is used in the transfer from ship to lighter, otherwise the polite and obliging company furnishes no better means of leaving the vessel than to crawl through the cargo port on the lower deck and drop or tumble into the rising and falling lighter alongside, with imminent risk, by means of a mistimed drop, of fracturing or dislocating your limbs and the almost certainty of smashing any article of baggage upon which you may happen to alight; and this after charging \$100 for the passage, while carrying others all the way to New York for \$80 each!

Arriving at the wharf, one is hoisted up in a chair by means of the crane and steam engine used for less precious cargo; nor does the similarity between a person and any other package of goods end here, for the wharf company charges half a dollar a head for wharfage in addition to two reals for each *bullo* or package of baggage, and double as much for the lighter, so that landing is a costly business. It will be observed that the charges for baggage are per package, and as the weight of the package is scarcely considered, a saving may be made by uniting several valises, saddles, etc., in one *bullo* by means of sacks or cordage. This resource is not, however, available in the case of persons.

The next thing is the custom-house, to which the baggage is transferred on tram-cars. The examination of baggage is not strict, nor is the person searched, as a rule; and this laxity is taken advantage of by people who are posted, and who are willing to earn an honest (?) penny by the abuse of courtesy. The town of La Libertad contains two hotels, of which the one is bad, the other worse; for the rest it is little more than a village with a custom house, *cuartel*, etc., added. The cable-telegraph station here is conducted by an English gentleman named Clark, assisted by his wife; they are very polite and obliging to strangers. The postmaster is also obliging, in a slightly different way; that he is polite goes without saying, he being a native of the country. To an inquiry for letters for strangers, the usual reply is the enrollment of all such in the office to examination by the applicant, who is thus at liberty to take his choice, which is a simple and effective way in which to overcome difficulties of spelling and pronunciation.

Between the port and San Salvador, the capital, a distance of about 30 miles by the road, there is a stage-line; the trip is made in from four to eight hours, according to direction, up or down and season, wet or dry, including a half-hour for lunch at Zaragosa—fare, \$4. San Salvador is a nice little city, as cities go in these countries, which I cannot take space to describe minutely. The streets are narrow and irregular, but clean, having good drainage into a river. There are three plazas, two of which are inclosed gardens with well-paved walks, music-stands and seats; the third, or *plaza de armas*, is the largest. It was formerly occupied, when not required for other purposes, by a horde of small dealers in fruit, food, clothing, trinkets and other trash, which have lately been mostly transferred to a fine new market-building, roofed with corrugated iron, and well paved, drained and stabled.

The dealers or *comerciantes* mentioned are mostly poor folk living in the enshrined and surrounding country, chiefly women who may be met by hundreds in the morning coming to town with their stocks on their heads; there are, however, plenty of good stores in the town. Salvador is an independent republic with a population of less than a million; the people cannot be distinguished by a stranger from those of the neighboring nations. The country seems quite prosperous, its debt being small and its bonds quoted high in the nineties. The president, Menendez, is the people's man, and seems to be an honest officer who is doing his best to put a stop to "boodling" in the Government, for which he is cordially hated by those who have heretofore fattened on plunder, a number of whom have recently been detected in a treasonable conspiracy and inconspicuously expelled.

Our arrival occurred during the great municipal fiesta of the city's patron saint, which lasts 10 days, during which a good deal of powder is exploded in the shape of fireworks and salutes by cannon and mortars; also there are grand processions with ornate structures on



wheels, drawn by oxen or by men, and carrying allegorical and historical figures, both alive and otherwise, of liberty, Columbus, saints, martyrs, etc., each day being devoted to a special subject, and the last grand triumphal car being surmounted by an image of Saint Savior himself.

A peculiar feature of the firework part of the festivities is that it takes place by daylight, and that the fireworks are of a character to appeal more to the ear than the eye; this may, and at first does, seem stupid, but like many other things which to our agotism seem stupid, it has its good reason. The great festival occurs in August, that is, in the middle of the rainy season, and as the clerk of the weather office in Salvador has ordered that the display of celestial fire and water works shall take place almost daily in the evening, the managers of the earthly display have wisely yielded to the necessity of the case.

We "strook" several other fiestas during our travels, for these are a feast-loving people, and extremely fond of fireworks at all times, so that there seems to be a constant fusillade of rockets and bombs going on. They are also fond of music and of military display. The soldiers are kept drilling and parading and dragging Hotchkiss guns about by means of oxen, while a fine band of 50 pieces, under a German master, has no sinecure but may be heard from early morn to thunder-storming eve, playing marches in the streets or operas in the plaza. Those who claim to be judges say this band is equal to the best of ours. I thought many of the marches very pretty, and the only fault I could find with the opera was that which I always find in that class of music—I didn't understand it.

The Chief of Police of San Salvador is an American named Fitch who takes his life in his hand every day of the year. The Government Engineer is another American named Lord; and the best and most trusted, though not the highest officer in the army, is Col. Sherington, an Irishman, who was formerly in the British army, and was not far from the scene when the Prince Imperial was "abandoned" to be killed by the Zulus. By all accounts it was the skill and gallantry of the colonel, backed by the courage of his troops, that won the battle in which Gen. Barrios was killed, and which was jeopardized by the cowardice and treachery of the native officers, some of whom he found in a house during the battle sorting cartridges for their soldiers. Sherington was the only colonel in the army of Salvador who was not promoted for that day's work.

The best place for a stranger to stay at in the capital is probably the Hotel Aleman, where board and lodging costs \$1 50 per day. American gold commands a premium of 30 per cent.

Salvador is the most thickly populated country on the continent, and ranks, they say, next to Belgium in that respect; consequently there is not much unoccupied good land. It is a beautiful country, less mountainous than Honduras, and it has very fair roads even in the wet season, and they are put in splendid order every year after the rains. The soil has been formed from volcanic rocks, and, as is always the case with such, is very prolific. These countries are generally supposed to be unhealthy; for my part I was as well in Central America as anywhere else. My companions were eating quinine nearly every day; I, "the only delicate one," as one of them said at the start, took a single quinine pill in four months, and I was not sick a day. Of the others, each of whom was indisposed more or less, only one was dangerously ill, and he got sick before landing, probably from much food and little exercise on the steamer, or perhaps because he neither smoked nor took his liquor as all the rest of us did; finally, I suppose, because he couldn't help it. That the climate is debilitating to our people cannot be denied.

As to eating fruit, I ate about all I could get, which was not always as much as I desired, but not between meals, nor unless it tasted good to me; as soon as the flavor palled, or I no longer perceived the delicate aroma, of the banana for instance, I stopped. I think this is a good rule. I never saw a ripe orange in Central America, though I saw splendid trees with trunks over two feet thick and loaded with fruit. I suppose they do get ripe sometimes, though I am told that birds or insects destroy all ripe fruit, but a Central American orange half ripe is better than a Californian when quite so. I could say a great deal more about this interesting country and its people, but as my stay was, but must close for the present at least.

#### Pritchard Creek, Cœur d'Alene.

EDITORS PRESS:—The outlook for the coming season in this particular part of the camp is not at all flattering. There is but little snow in the mountains compared with other years, and what little there is seems to be going off very fast. The weather has been warm, with considerable rain, since the first of present month. From present appearances the run of water or mining in side gulches will be quite short this season, as I believe there is not a single placer mine being worked on Pritchard creek. The output of our placers will be necessarily small, still we have hopes in our "Old Wash" making us happy yet.

One of our quartz-sills and its belongings was sold at sheriff's sale a short time since, and

now the Golden King Mill and Mining Company, which started up a few weeks ago for the 17th time, but lastly under new management, has very unceremoniously shut down without paying their bills or help, consequently attachments are the order of the day. But a few months may make a great change here for the better, and I hope to be able to write a more cheerful account next time.

Mr. Pritchard, the discoverer of this mining camp, lost his two-story hotel (the only hotel in the town of Eagle) by fire about one month ago; the district records and postoffice, kept in this same building, were also destroyed.

R. V. W.

#### Tuolumne County Mines.

##### Soulsbyville.

EDITORS PRESS:—I am informed that J. Clark has disposed of his interests in the North Star mine to a San Francisco company. They have taken the water out and commenced work, drifting. The shaft is down 200 feet and there are large bodies of ore in sight, the vein being several feet in width.

The superintendent, Mr. Brown, informs me that this company is going to erect a steam-hoist on the Luria mine. This mine was worked in former days, and it is said that some fine ore was taken out. The vein is six feet and over in width. There is a fine ten-stamp mill near the above two mines belonging to the company, and all that is wanted is good ore and plenty of it, and the mill will then be heard pounding out the gold. I sincerely hope this company will take out millions.

It is expected that a company will commence work on the Wheel Perrin mine in the near future. It is situated 400 or 500 feet west of and running parallel with the Soulsby mine.

The Soulsby mine is closed down at present, only running the pumps. It is to be hoped that they will commence work in a short time; no doubt there is plenty of good ore remaining in the mine yet. All that is required is money to open it out. They had a fine chute of ore in sight when work was suspended. Mr. John Leechman, former superintendent of the mine, arrived in town Sunday from San Francisco.

The Independent, like many other good mines, is still idle. This mine is situated about 400 feet to the east of and running parallel with the Soulsby and is owned by Messrs. Shorwood, West and others. There is a good vein and good ore has been taken from this mine, and no doubt if the mine was properly opened it would make a good property.

The Live Oak, located at the south and being the same vein as the Black Oak, is idle, and as the Black Oak is running in full blast and looks well, there is no doubt but what the Live Oak is also good, if capital was available to open it.

Mr. W. H. Barron, one of the leading merchants of this place, has a mine located two miles north of here. He has sunk a shaft 85 feet in depth and run levels connecting with another shaft. The vein is 12 to 18 inches, and the ore shows gold. Mr. B. hopes to get capital this summer to open what he thinks to be a good property.

The owners of the Soulsby gravel mine are trying to get men to open their mine the coming summer. They claim it is an old river-bed, and I am of the same opinion myself. They have sunk a shaft 95 feet in depth, and the different kinds of ground they went through is enough to convince any one that they are near an old channel; \$500 invested will test it thoroughly, and no doubt a river-bed would be opened that would contain its thousands. Men with capital should examine this claim, and I am sure they would have the same opinion as many others. The small amount of \$500 would test it, and is not much to risk by men with capital, but to the owners it would be considerable.

MINER.

Soulsbyville, Cal.

#### Restricting Miners to One Claim.

EDITORS PRESS:—I see by the PRESS that Mr. Stewart of Nevada has introduced a bill to change the mining law, restricting a miner to one claim on a vein or lode, and to prohibit a man relocating a claim by him once abandoned or forfeited. In your remarks you seem inclined to favor the measure, but are doubtful of the efficacy of any measure to prevent the claim being secured somehow.

Are you quite sure that such a measure will be beneficial to the mining community at large? In the first place, who is to say that two claims are on the same vein before such is proven to be the case by actual connection? I am sure every miner will bear me out when I say that such connections are easily made, and if ever made, there are generally breaks or faults, that still leave the matter in doubt. It seems to me that the opening for litigation is quite sufficient, without making more unknown quantities.

In the second place, if a mine can be traced further than one claim, who has a better right to it than the finder? It may be he has spent years looking for such a mine, and every one knows how much more easy it is to sell a mine, or to enlist capital, when controlled by one man or company of men, than when there are diverse interests. As all syndicates usually try to get hold of all the property contiguous to the

mine they intend to purchase, if for no other reason than to shut out litigation, it seems nothing more than fair that if a prospector is to be allowed more than one claim, he ought to be allowed those claims as close together as possible. Again, how many men could be lucky enough to get the best claim in a new district at once? In fact, experience has proven that it is the exception rather than the rule. I have a property on which I have done a great deal of labor, and until late last fall I could not have taken a claim out of the lot and secured the main ore chute. I think Mr. Stewart will do more real injury to actual prospectors than even that stupid Alien law has done to the whole community.

As to prohibiting a person relocating a claim he has once abandoned, the object is to prevent men from defrauding the Government, by letting their claims lapse and being on hand Jan. 1st to relocate.

It seems a hardship to forbid any man from ever relocating a claim once abandoned in good faith, because he may at some future time see some encouragement to renew his efforts, and perhaps succeed, whereas he is debarred from that, because he once had a location on that ground. Now why not debar a man for a certain length of time, say three months? Surely in that time no one could say he was trying to defraud any one. If after three months no one wanted the abandoned claim, he would then be entitled to relocate it if he saw fit.

Then again the law says, "that a claim is forfeited on Jan. 1st unless \$100 worth of labor or improvements has been done on it, or the party has resumed work." If a party can hold a claim by resuming work on Dec. 31st and work Jan. 1st too, where is there any law to compel him to finish the \$100 worth of labor? And again the law distinctly says the labor must be performed "within the year;" how can any one reconcile that section?

I think if it was made imperative that the labor must be finished before the 1st of January, that no person was entitled to relocate a claim by him forfeited or abandoned for at least three months after Jan. 1st, the date of such forfeiture, a great deal of the seeming trouble would be obviated.

It is useless to try to make laws to suit everybody. There are always plenty of law fellows following up the actual workers. My way would be to give the latter all the advantage possible.

C. B.

Gibbonsville, Idaho.

HARDWOOD LUMBER FOR HOUSE-FINISHING. —A Chicago paper says: In other countries the general use of hardwood lumber is taken as a matter of course. But little more than 10 years since it would have been hard to find a firm in Chicago doing business in hardwood lumber exclusively, except perhaps for use in the manufacture of furniture. To-day this is entirely changed. No house of any pretensions is erected that has not more or less hardwood trimming, and usually in the entire trimming, as well as the floors, nothing but hardwood is introduced. This is not altogether because the architectural taste has changed, but largely because many of the hardwoods, such as maple, ash, oak, and even cherry, can be furnished dressed for less money than the same grade of soft pine can be obtained. One firm, and probably the largest in the line in the West, Hayden Bros., have a yard covering six acres of ground, in which there is nothing but hardwood lumber. The yard is centrally located, with ample track facilities, and within it is piled over 6,000,000 feet of hardwood lumber of all descriptions. Sheds are built for the storage of fine mahoganies, etc., and large drying kilns enable the firm to deliver kiln-dried lumber on short notice, and not only supply the local market, but ship to all parts of the country.

THE Trinity Journal says: Mesere. Steinberger and Chapin returned Monday from Cox Bar, where they went to examine the coal deposit. Mr. Steinberger is an expert in coal, and says he was greatly surprised in the quality of the vein there—he did not expect anything. It is rumored that the gentlemen were taking notes of the most feasible route for a railroad across Trinity county to Humboldt, not only to connect the northern coast with the upper Sacramento valley, but also to tap our magnificent forests of sugar pine. They procured a topographical map of the county and ascertained the height of different passes, also something of the "lay" of the country. They returned to San Francisco Tuesday. We expect their visit will result in great benefit to Trinity. There are traces of coal found from Cox Bar through Hyampom to the South Fork mountains. If these prospects develop into a deposit of any quantity, the railroad is bound to seek the coal. With or without coal, we have an idea that a railroad will cross the county inside of 10 years.

WELDING MALLEABLE IRON.—Malleable cast iron may be welded together or welded to steel or iron by the same process as you would weld two pieces of steel. Experiment first with two useless pieces. A few attempts will cause you to become an expert at the business.—Blacksmith and Wheelwright.

ENAMELING PAPER OR WOOD.—An impervious enamel for paper, wood, etc., is a solution of shellac in methylated spirit. A coating of this is applied, and then another coating laid at a high temperature and under great pressure.

#### Amending the Mining Laws.

EDITORS PRESS:—I send you a copy of a letter I have addressed to Senator Stewart in regard to the amendments he proposes to make in mining laws. I shall be glad if some of your readers will give their views on the suggestions I make. I think it is very important that persons opening lodes by means of a tunnel should be compelled to do some work on all claims they hold so as to identify them.

A PROSPECTOR.

The Hon. William M. Stewart, United States Senate, Washington, D. C.

SIR—I see from that excellent weekly journal, the MINING AND SCIENTIFIC PRESS of San Francisco, that you have introduced a bill in Congress to amend the present mining law. It is time that an end should be put to the system of holding mining claims year after year by merely relocating them. I know of cases where prospectors have held dozens of lodes from six to nine years, without doing an hour's work, by following that plan. I do not believe, however, that your proposed amendment will end the evil alluded to. Your making it illegal for the holder of a lode to relocate it would not prevent him from getting a friend to make the relocation for him. That is exactly the plan followed now. A claim-owner rarely relocates in his own name. There is only one way to stop the present practice, and that is to compel a locator to do work before he can acquire title. An amendment might be made to the present law as follows:

"Be it enacted that from and after the passage of this amendment, no record of a mining claim shall be valid until the sum of \$100 has been expended upon or beside its outcrop, and a certificate that said work has been done in good faith and of full value according to the rate of miners' wages prevailing in the district, verified by the locator, under oath, before a proper officer, has been filed with the recorder, who shall thereupon, and not previously, file the location notice for record. If said work is not completed within 60 days from the date of discovery, or location, the ground shall be subject to relocation, and such work, when done, shall not count as part of the annual assessment labor, as now required by the Act of Congress to which this is an amendment.

"It is also provided that the provision in said Act of Congress which admits of work being done in a tunnel running for a lode, without working upon the outcrop, shall, in the case of locations made after the adoption of this amendment, be applicable only after \$100 have been expended in exposing and identifying the lode, or lodes, for which said tunnel is being opened."

If a man believes a lode is valuable, he will do the work required by an enactment as above suggested. It will prevent men who are unwilling to do such work from holding mineral lands, dog-in-the-manger style, and if it does seem to press hard on men that are physically weak, it will have the good effect of causing them to abandon an untenable position—that of trying to hold quartz lodes without work, when work is absolutely necessary to give them value.

Your other proposal, to limit a locator's right on a lode to one location, will be easily evaded also, if it becomes a law. The discoverer of a lode will get friends to take up as many extensions in his behalf as he may desire. I do not think it would be wise to adopt such a limitation, my reasons being the following:

There is still a large amount of practically unexplored mineral land on the Pacific Coast. It is good policy to encourage exploration, and one claim in a new district is not sufficient to do that. If a locator finds that some idle fellow has taken up the continuation of his vein and intends to wait until he sees if the original opens well, he is checked in his operations by a knowledge of that fact. On the other hand, if an explorer were permitted to take up as many claims on a lode as he was able to do work upon to the extent of \$100 before making a record, I do not see that the Government, or individuals, would be injured by his having that privilege. He might be able to sell one of his locations, and so get money to open another, and thus start a new industrial center, as was done by the discoverers of Tombstone district, Arizona, when they sold the Contention claim.

Your proposed amendment might, if it became a law, cause costly and even ruinous litigation. Suppose a prospector found a "blind" lode that was "faulted." He might, by the faulting of the vein, think it had a particular course, and would stake off his ground accordingly. Some hundreds of feet off he might find another outcrop, and that, too, being thrown out of its true course by dislocations, he would feel himself justified in claiming it as a distinct lode. After years of development, the two locations being formed on one vein, the courts would declare the second location invalid, thereby occasioning heavy loss to innocent purchasers.

Your practical mining knowledge will enable you to see the importance of the above suggestions. I hope that miners will give attention to the subject through local and mining journals, and after due discussion there may be enacted such amendments to our otherwise really excellent mining law as will make it practically perfect.

A PROSPECTOR (for 25 years).

Now that a number of old prospects which for the past few months have been worked are developing good, would it not be wise for others to work their old claims?—Pitche Record.





A. T. DEWEY.

W. B. EWER.

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SAN FRANCISCO

Saturday Morning, March 10, 1888.

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## Passing Events.

The heavy storms of the past week have added materially to the accumulation of snow on the mountains, so that we are sure of a good water season this year for the miners. The farmers have had all the rain they need, too, so that a prosperous year will doubtless result.

Considerable attention is being directed to the mines in Washington Territory and Oregon, and both these regions will be better prospected than ever this summer.

Although no good and steady flows of natural gas have been found in this State thus far sufficient for industrial purposes, a number of places are being prospected for it, where there are good signs of its existence. With the growth of the petroleum industry, and the increase of productive fields in California, more prospecting for this is also carried on, the business being now a profitable one.

Coal and iron still continue at high prices, the former especially. Prospecting for coal is now going on all over this State, and several companies have been formed for the purpose. No coal of very good quality has ever been found in California, but some good coking coal has been found in Washington Territory.

WITHIN a circle of 25 miles around Rawlins, Wyoming, there is said to be sufficient coal, iron, copper and borax to make it a city of 50,000 people within the next five years.

## Sierra County Mines.

We had a conversation this week with Mr. T. D. Calkins of the Sierra Tribune, which is one of the best interior exchanges, that makes a specialty of gathering the mining news of its locality. The Tribune is published at Sierra City. The town has been in a state of quarantine for some months, but the smallpox scare is now over. Mr. Calkins informs us that the mining situation in that region is very favorable and great activity is expected this summer. He says that the mine just now attracting the most attention is the Mountain mine, across the lake from the Young America. It was sold a short time ago by Harry Warner for \$60,000 to Sunderhaus. They employ 25 men at present; they have no mill, but expect to erect a 40-stamp mill about the 1st of May on the North Yuba. The mill will be run by water-power.

The Salinas and Mercer 10-stamp mill started up about two weeks ago. It is near the Keystone mill in the Keystone district.

Sacred Mountain mine is a new mine. They are running a tunnel, have some very fine ore, are working a few men. There is another ledge on the other side of the river, the Banner mine. They are running a tunnel there; have one in about 100 feet, and have a four-foot ledge there of very good ore.

The Marguerite mine is in litigation and is lying idle at present. The Keystone mine was bought by ex-Sheriff Mead a few months ago. He is working 25 men there and expects to do well in the spring. He has another mine in connection with that one.

The Young America is working 150 men; they have just declared a dividend of two per cent with 15 days' run in the month; 500 shares in the mine. Their rock runs from \$10 to \$13 per ton. They have a 40-stamp mill, and as they run by water-power their expenses are very light.

The Sierra Battes have about 300 men at work. They are building a new mill of 20 stamps in place of the old 50-stamp mill that burned down. They run by water-power. They have much better prospects in the long tunnel than have been shown for some time. The Yuba mill of 60 stamps runs night and day on ore, and the chlorination works run steadily.

The Golden mine will have to have its tunnel in 970 feet before striking the ledge. The San Luis mine expects to put up a staop-mill in the spring. They expect to tap the vein along the 1st of April or May, and will put up a ten-stamp mill. It has some very fine ledge ore on top. It is south of town, upon the same hill as the Marguerite. The Salinas and Mercer have a five-foot vein; it looks very fine, and their ore will pay all the way from \$10 to \$15 or \$20 per ton. The Mountain mine is one of the biggest things ever discovered in this State. You can stand several feet off from the ledge and see the gold in it. The party who sold it has owned it for the last 20 years. It is one of the most important discoveries we ever have had there. It is a bigger mine than the Young America. During the last year almost every tunnel that has been run there has proven a success. The Keystone mine is right near town. They have put up a four-stamp mill—just started up a month ago. They struck some very rich ore there—regular bonanza rock. The Buffalo mine has made partial arrangements to put up a ten-stamp mill there. The Primrose mine is in the same canyon that the Buffalo mine is. They expect to start up their mill as soon as the snow is gone.

The Gold Bluff mine, at Downieville, has struck some very rich ore, and is doing well. It is the only quartz mine at Downieville that is doing much. Gravel mines are doing pretty well.

Mr. Busch of the Young America is interested in the tunnels over there. Sutherland, now in Scotland, is interested in the quartz mine over at Poker Flat. I think this summer we will have probably 1000 miners employed around Sierra City. The Mountain mine alone will employ 200 men, and the Sierra Battes always employs 300 men. The camp will do better this year than ever before. In the Gold Valley district they have from eight to ten feet of snow. The most we have had this year has been five feet on a level. Gold Lake is about ten miles from Sierra City.

At last Placerville has railroad connection and is happy.

## The Plymouth Consolidated.

## A Big California Gold Mine.

The Plymouth Consolidated is one of the largest producing gold mining companies in California. In 1887 the mines of the company produced \$736,304.75, and the operating expenses were \$297,404.26. This left a profit of \$438,900.41. From this 12 monthly dividends were paid, aggregating \$375,030, and \$46,861 was spent in construction. The surplus, January, 1888, was \$98,118.91. In the construction account was the cost of the addition of 40 stamps to the Pacific mill and the electric-light plant.

This company was formed June 1, 1883, by the consolidation of the Empire, the Amador Pacific, and the Plymouth Companies. The mines were well developed, and a considerable amount in dividends has been paid. Prior to the consolidation, gold bullion to the amount of about \$2,500,000 had been produced.

The following is a statement of all the receipts and expenditures of this company from its organization, June 1, 1883, to January 1, 1888, a period of four years and seven months:

June 1, 1883.—Cash on hand at time of organization of this company.....	\$153,319 80
Gold Bullion Produced by the Mines as Follows:	
To Jan. 1, 1887.....	\$3,063,194 69
For the year 1887.....	736,304 67
	\$3,804,499 36

Total receipts.....	\$3,957,819 16
---------------------	----------------

Disbursements:	
Operating expenses.....	\$1,442,074 08
Construction (since June 1, 1883).....	217,626 17
Fifty-five dividends, averaging \$40,000 each.....	2,200,000 00
	\$3,859,700 25

Cash on hand Jan. 1, 1888.....	\$98,118 91
--------------------------------	-------------

The heavy and regular dividends paid by this company are made from ore of no high grade. The average yield of gold last year was \$7.59 per ton. There is no place in the United States where cheaper mining and milling can be done than in California.

During 1887, except when short of water, both the mills ran with great regularity and crushed in the aggregate 97,000 tons of ore. The figures of yield and cost are as follows:

Average yield per ton, 1886.....	\$9 18
Average yield per ton, 1887.....	7 59

Increase yield per ton.....	\$1 41
-----------------------------	--------

The cost of production in 1887 was as follows:

Per ton.	
Mining.....	\$3 32
Milling.....	30
Saving and reducing sulphurets.....	17
General expenses—office, taxes and prospecting.....	17

Total average cost, including all expenses.....	\$9 07
---	--------

The average cost was increased by the remarkable drought, which so reduced the supply of water that for weeks but one-half, and frequently but one-quarter of the stamps, could be run. It was not until the last week of December that rain fell in sufficient quantities to run all the machinery. The almost entire absence of rain for three months after the usual time is unprecedented. Heavy storms have since followed, and an abundance of water is now assured by accumulation of snow in the mountains.

The company's property is at Plymouth, Amador county. They own land a mile in length on the line of the mother lode. The principal mine consists of an immense chimney of ribbon quartz from 30 to 50 feet wide and 315 to 450 feet long. The ore mills freely, and contains from one to two per cent of sulphurets. There are four shafts, three of which follow the vein, and the fourth—the Pacific—is vertical. This latter has three compartments and is equipped with superior hoisting machinery. Self-dumping automatic skips are used, hoisting 3000 pounds of rock each, with English flat-wire cables. The derrick frame is 76 feet high. On the Pacific claim, level No. 1 is 1060 feet below the surface, and level No. 7 is 1600 feet below the surface. The temperature of the mine is moderate, and very little trouble is experienced from water. No pump is needed, a bucket running a few hours a day keeps the mine dry.

The two mills have an aggregate of 160 stamps which crush 400 tons a day. Connected with the mills are 48 Frue concentrators for saving sulphurets. The Pacific mill is one of the best equipped in the United States. The chlorination works have proved a gratifying success. All the machinery on the property is run by water-power. The water is supplied from the company's own canals, except that used in the Pacific mill, which is furnished under an old contract with the Amador Canal Co. Steam connections have been retained at

the shafts, so that in the event of accident, a change could be made from water to steam at an hour's notice. The quartz-mills are the largest in the world, with one exception. The secretary of the company, P. Wendover, Bedford, states in his report that a piece of rock one foot square and one mile in length represents the amount crushed by the Plymouth mills every 24 hours.

The company owns extensive water works. In addition to the several reservoirs there are canals as follows: Main, 25 miles long, runs from the middle fork of the Cosumnes river to Plymouth; South Fork, or Bridgeport, 20 miles long, runs from main fork of the Cosumnes to a point one mile northeast of Plymouth, where it joins the Main canal; Simpson, 22 miles long, runs from the south fork of the Cosumnes river to the reservoir, two and one-half miles northeast of Plymouth. Douglass, 34 miles long, with lateral branches aggregating 15 miles more, conveys water from middle fork of the Cosumnes river to Indian Digging; Tyler, four miles long, runs from south fork of the Cosumnes to reservoir at Tylers ranch.

In addition to the above there are several branches, and also canals leading the water from Plymouth to the country below, in all about 40 miles, the whole system making a total of 160 miles of canal owned by the Company.

The water used for power is conveyed from the Simpson canal reservoir, two and one-half miles, in iron pipe of 18 inches diameter. At the Empire and Woodford shafts a pressure of 550 feet is obtained, and at the Pacific shaft a pressure of 561 feet.

To communicate this power to the machinery no less than 23 wheels are required. Of these three are turbine wheels, of the kind known as the "Lafel" turbine. The remaining 20 are "hardy-gurdy" wheels. They are of three varieties, the "Knight," the "Donnelly" and the "Pelton." These water-wheels now run all the machinery on the property, including mills, hoisting gear at the shafts, sawmills, blowers, rock-breakers, concentrators, air-compressors, ventilators, blasts and machine shop.

The canals are also utilized to bring to Plymouth timbers for the mine. Seven or eight thousand logs a year are used. They are large and heavy. Instead of being hauled over difficult roads at great expense, they are easily floated down the canals from the mountains and dropped into the company's yard, almost without cost for transportation. The improvements have cost over \$500,000, in addition to what has been expended in development of the mine and for operating expenses. The superintendent, Mr. E. L. Montgomery, has had charge of the property since December, 1879, while Mr. Wm. Jones, the foreman, has nearly completed his thirteenth year of service. Mr. J. J. Herr has directed the affairs of the office at Plymouth for seven years.

## Foundry Notes.

Mr. J. B. Pitchford, mechanical engineer and draughtsman, who has long been connected with the Risdon Iron Works, has now associated himself with Rix & Firth of the Phoenix Iron Works, 18 and 20 Fremont street.

The Union Iron Works has completed a 60-horse power engine to run the stone-cutting machine at the Rocklin quarries. This machine is expected to do the work of 20 stone-cutters. The engine will also aid the hoisting and other work about the quarry and shops. It will be used at Griffith's quarries, where about 60 men are employed.

Mr. Wm. H. Hampton of Portland, Oregon, writes us that the Oregon Iron and Steel Co. have resumed work at their plant at Oswego after having been shut down for three years. They are building an entire new set of furnaces of the most recent and approved type and expect to "blow in" about June 1st.

The Pacific Rolling-mills give steady work to some 700 men. In addition to the usual work of a rolling-mill, they are doing a good deal in the direction of building cable railroads.

The Fulton Iron Works have several marine engines on hand for auxiliary steam schooners for the coasting trade. A great many of these vessels have been built within the past two years, and have been found to be much more profitable than the sailing schooner so long used in the lumber trade.



### A New System of Teaching Geography.

In the ordinary method of teaching geography in the schools, maps or charts are employed, either complete with colored subdivisions or in outline, but these maps do not always convey very clear impressions to the youthful mind. The maps are all made and there is nothing to firmly impress upon the children the proper idea of the geographical division. Willie M. Bours of Stockton, California, has applied for a patent on a map or chart for teaching purposes, in which the general outline of the whole State or country is made, and within this exterior outline are dots or points so placed that lines drawn through these points will give a general outline of the subdivisions of the country or its configuration, and from these general outlines the more exact indications of the configuration may be drawn. The pupil can therefore draw the various lines indicating the general shape of the subdivisions and may afterward make the more exact contour lines therefrom, thus gaining knowledge of the size, proportion and general appearance, which it is impossible to obtain from completed maps.

Mr. Bours calls this a "Lineal System." The objects are to assist the pupil to grasp the territorial relations of the divisions of a country, and to aid the pupil in the practice of this knowledge by giving directions for its application. The use of the system may be exemplified in a study of the geography of the United States. An outline engraving of the United States is shown on this page, with the dots or points indicating the corners or extremities of boundary lines of the States and Territories.

The general outline only follows the more prominent irregularities of the coast or boundary. The dots are placed in such position that lines drawn from these points or dots will show the general contour of the internal subdivisions of the State. By the aid of these dots the pupil will soon learn to construct all the subdivisions of the country; first, in general outline by drawing approximate straight lines through the dots, and afterward the more minute irregularities of contour may be indicated by dotted lines. For instance, the line drawn from *E* to *F* would indicate the southern border of Washington Territory (or northern boundary of Oregon) in an approximate manner, while the dotted line *e* would show the more minute contour. The line *M* would indicate the general contour of the coast of Texas, while the dotted line *m* would show the features more in detail.

The straight lines are used, to suggest the division of a country, to answer to straight-line boundaries, and for guidance in drawing boundary lines that are not straight. To draw the boundary line of California (the coast being already shown in the general contour) the pupil would make a straight line from *G* to *H*, from *H* to *I*, from *I* to *J*, and from *J* to *K*. Then to get the correct southeasterly line the dotted line *I* would be drawn.

To bound a division of a country, the pupil would be required to draw the boundary lines of the divisions contiguous to the one under consideration. For an example, let it be required to bound Wyoming. (See 7 on engraving.) The pupil would draw the boundary lines of Idaho (1), Montana (2), Dakota (3), Nebraska (4), Colorado (5), and Utah (6). In making these divisions, the following lines are drawn: *AB*, *BC*, *CD*, and *DA*, which are the boundary lines of Wyoming.

These outline maps or charts may be permanently drawn or indicated upon a slate or blackboard, or they may be drawn on silica slate, where the general outlines and dots may be permanent. Connecting outlines or contours may be drawn with pencil or other marking implement while the lesson is in progress, and afterward erased so as to leave only the permanent outline and dots.

This system is of great use to assist the pu-

pil to understand the territorial relations of the subdivisions of the country, its general appearance as a whole, and the relationship of the various outlines and irregularities of configura-

GILSONITE is being shipped from Utah to St. Louis and Chicago. It costs \$5 per ton to mine and sack it, and \$15 per ton freight. It is chiefly used in the manufacture of paints and

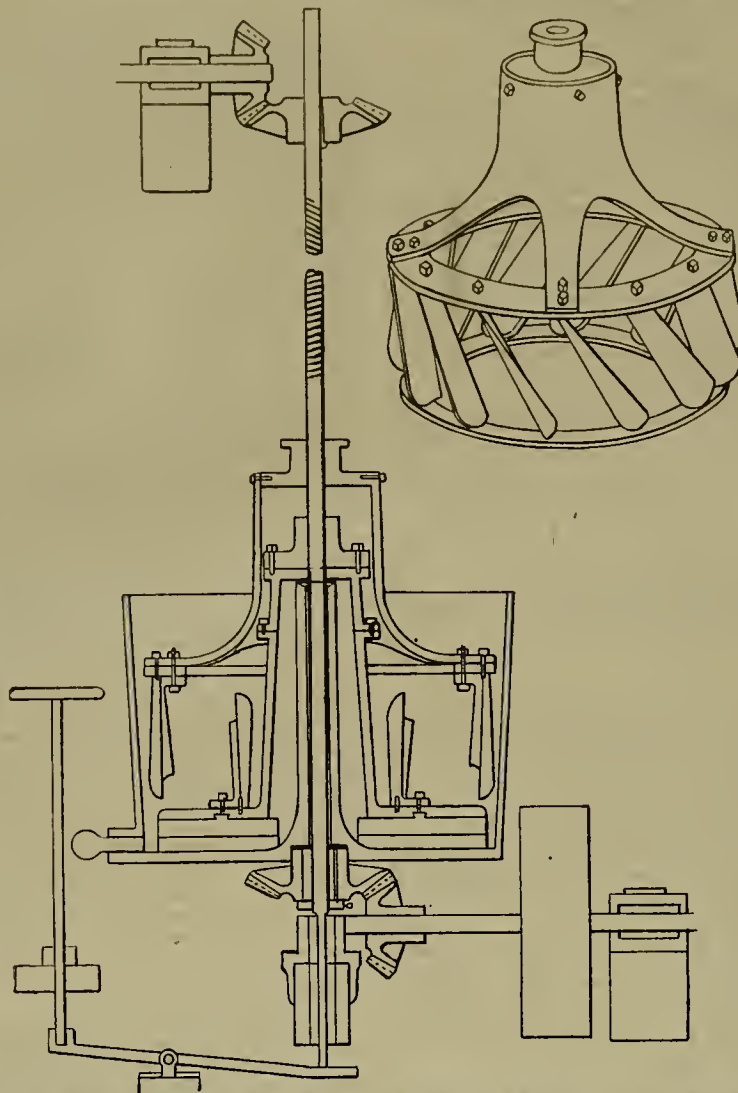


Fig. 3.—SODERLING'S IMPROVEMENT ON ORDINARY AMALGAMATING PAN.  
(For Description, see First Page.)

tion, showing also where the more exact outline of the country varies from the general one. Various charts or outline maps with dots may be made of all the great geographical divisions of the world. It will readily be seen that

varnishes, and is also used as insulators for telegraph wires.

THE coroner's jury investigating the cause of the explosion of the boilers of the steamer



ILLUSTRATION OF THE LINEAL SYSTEM OF TEACHING GEOGRAPHY.

practice with this system will fix the outline in the memory of the scholar better than the mere study or contemplation of a completed map.

THE mills worked 3129 tons of Cons. California and Virginia ore last week, which averaged \$32.67 per ton.

Julia have not completed their labors. Experts are now testing the iron of the boilers.

WM. H. GAYLORD was killed near Wehher creek bridge, in El Dorado county, on the first of March, by a cave in a prospect shaft that he and another young man were working.

### The Macroscopical Examination of Rocks.

The following was read before the California Academy of Sciences by Melville Attwood, at the meeting on Monday evening last:

The specimens selected should have a good fresh surface of fracture—size about three inches by five across, and one and one-half inches through. With a trimming hammer prepare the one and one-half face, so that by rubbing it on emery blocks you can get an even surface or polish on it. Then heat the specimen so that you can barely handle it. When in that condition rub Canada balsam on one-half of the polished surface. When cold it will harden so that you can handle it without injury. (A slice can also be taken from this face for microscopic slides.) By this method the different constituents of the rock are much better seen, and the inspection of the outer surface viewed as an opaque object with only the aid of a common magnifier—say of three powers—set in a spectacle frame, in which the different powers can be easily changed, will, in most cases, give all the information ordinarily required by the mining engineer.

The even surface not covered by the balsam, can then have the hardness of the different crystallized minerals to be seen on it easily determined, and also tested with acids, by applying a fine glass rod dipped in the acid to the different crystallized particles, and by the aid of the magnifier, the action, if any, can be seen.

The best mode of determining the hardness is to have the minerals forming the scale of hardness mounted something like the writing diamond. Break, for instance, the corundum, topaz, etc., into small fragments, and, after selecting those with fine, sharp points, proceed to mount them in the following manner:

Take a piece of brass wire three inches long by one-eighth of an inch in diameter, and with a file, make small notches on one end of the wire. Then take lapidary's cement, warm the end of the wire with a spirit-lamp or candle, and melt some of the cement on to it. By wetting your finger and rubbing the cement while warm, you can mold it into any shape you please. With a small pair of pliers, take the small fragments of corundum, etc., heat one end of the corundum, and then place it into the cement. If properly done, it will answer just as well as if set in metal, with this advantage, that you can renew it at any time, in a few minutes.

ON the great mother lode which runs from Jackson to Plymouth, Amador county, there are about 500 stamps in operation, and not less than 1000 men at work. It is a continued scene of activity from the Cosumnes river to the Mokelumne. The distance between the two rivers is about 14 miles. The mines now working are the Plymouth with 160 stamps, the Potosi with 10, Black Hills 10, Gover 20, Quartz Mountain 10, Keystone 40, South Spring Hill 30, Iowa 10, Mahoney 40, Wildman 10, Kennedy 40, Zeile 40, Moore 10 and Nevills 10. There are several small properties besides these.

THE smelting works at Great Falls, Montana, will be ready to treat ore some time in August. The main building will be 1200 feet long with iron roof, and will contain four 65 ton smelters. The contemplated smelter at Helena will be of similar capacity. These places will afford good markets for Cenr d'Alene ores.

MEADOW LAKE.—Another process has been found to work the Meadow Lake rebellious ores—that is, it is expected to do so. Meadow Lake is responsible for a good many processes, experiments and failures. The trouble probably is that the ores do not contain as much metal as they are supposed to.



## MECHANICAL PROGRESS.

## Machine vs. Hand Work.

A great deal has been said and written about the advantages of the employment of machinery in place of hand labor, which is entirely misunderstood by those who are not mechanics, or at least intimately familiar with mechanical operations. We constantly see such expressions as "the substitution of the unerring accuracy and uniform action of a machine, for the uncertain and ever-varying hand labor." Now, such an expression, while in one sense it is true enough, is, nevertheless, misleading to those not familiar with such matters.

It is not true, except in very rare instances, that a machine will produce work of better quality or greater uniformity than can be produced by hand labor, and the machines are usually employed simply because they will produce work of the quality and uniformity desired at a much less cost than would be the case if the grade of skilled hand labor required to produce equal results were employed. Many of the parts of small machines, such as sewing machines, were formerly filed to shape and size, the quality of the work and its uniformity depending upon the skill of the filers, who were not the highest of skilled workmen. This process has been superseded by milling machines and other operations, by which the cost has been reduced, the quality greatly improved and greater uniformity secured. But the tools, milling cutters, gauges and other appliances, by which this result is secured, are made by the highest skilled labor, and if this grade of labor were employed upon the pieces themselves, they could be made of better quality and greater uniformity than it is possible to secure by machinery.

When a new sewing machine, or a new gun, or any similar article is invented or designed, which is to be made in large numbers, it is the usual practice to first build a sample or model machine, which, when finished, is put to a practical test. When found to be entirely satisfactory it is taken apart, and the pieces which composed it used as samples, by which the gauges, jigs, templates and fixtures are made, by means of which the thousands are to be produced. Now, for the building of this model machine, the highest skilled labor is usually employed, and it is fully equal to, if not superior to, any which are afterward produced by machinery. And, moreover, the same labor could produce a duplicate of this machine, but it would cost, perhaps, a hundred times as much as those produced by machinery, and this is, after all, the real reason for the employment of machinery.

So much has been said on this subject that many will hesitate to believe that there is scarcely anything produced by machinery which cannot be improved by skilled hand labor, if there are economic reasons for such improvement; but nevertheless it is a fact. Take, for instance, the apparently simple matter of the production of a true flat surface upon a piece of cast iron. It is well known among mechanics that the best of such surfaces are produced by skilled hand labor, and all that the best machines can do is simply to rough out, or prepare the surface for the hand labor, by which it is perfected.

There are plenty of machines which will produce holes in steel with a great degree of precision and uniformity, but for superior holes can be produced by hand lapping, and can be had by any one who is able and willing to pay for the increased cost.

Transits, theodolites, levels and other instruments must depend for their accuracy upon the skill of the mechanic who makes them. It is safe to say that the degree of accuracy which is required upon such work will always require skilled hand labor, and can probably never be attained by machinery.

Much has been said on this subject in connection with the manufacture of watches, and the introduction of machinery has accomplished wonders in this department of industry. But, notwithstanding all that has been done, if one wishes to procure the best watch which it is possible to produce, and is willing to pay for it, he must buy a watch which has been made, or, at least perfected, by skilled hand labor.

Up to a certain degree of precision and excellence, machinery is superior to hand labor, but usually only for economic reasons, and it is not true, as many seem to think, that the very highest degree of precision is obtained by machine operations.—*American Machinist*.

**HARDENING CAST IRON.**—The hardening of the surface of cast iron by the well-known process of "case-hardening" has long been understood and utilized; but hardening cast iron after it has left the mold is something quite new. A correspondent of the *American Machinist* says: "To-day I had to turn 16 cast-iron rollers, all of which needed case-hardening, as otherwise they would wear off too fast. We case-harden cast iron by heating it to a good cherry red, apply potash, and dip it into the water, the same as we do for wrought iron." The editor of the *Machinist*, who received the roller, comments on it as follows: "The roller spoken of by our correspondent is about 1½ diameter by 3" wide, and has the outward appearance of case-hardened wrought iron. It is quite hard, not only upon the surface, but upon breaking it we find it hard all the way through, so that it cannot be

filed. The fracture has the appearance of ordinary cast iron. Thus it would appear that this is a method of hardening cast iron which would probably be useful in many places, but it is not a case-hardening process according to the generally accepted meaning of the term."

## Power from Hot Water.

Respecting the power which can be stored up in a boiler surcharged with steam and water at high temperatures, the London *Engineer* makes the following calculation, embodied in an article on the Nordenfeldt submarine boat:

The submarine boat Nordenfeldt uses the system suggested many years ago by Doctor Lamb, and used by him for propelling street cars. If the pressure in a boiler is lowered the temperature falls, and part of the sensible heat of the water becomes converted into latent heat by evaporation. The two boilers contain about 27 tons of water. The pressure of the steam is, let us say, 160 pounds above the atmosphere, or 175 pounds absolute. The corresponding temperature is 371° F. Now, the engines will work well with steam having a pressure of 50 pounds above the atmosphere, or 65 pounds absolute, the temperature of which is 298°. In falling from one of the temperatures to the other, each pound of water gives out 371° - 298° = 73 units. There are 60,480 pounds of water, and 60,480 × 73 = 4,415,040 units. Each pound of steam at 65 pounds pressure will represent 904 units, 4,415,040

and  $\frac{4,415,040}{904} = 4883$ , nearly, pounds of steam of 50 pounds pressure, which can be supplied after the ship has been submerged. Assuming that her engines use 20 pounds of steam per horse per hour—a very high estimate 4883 —we have  $\frac{4883}{20} = 244$  horse-power for one hour.

**PUDDLING IRON DIRECT FROM THE BLAST FURNACE.**—For about three months the North Chicago Rolling-Mill Company has been experimenting at Milwaukee in puddling iron direct from the blast furnace, and now believe they have made the process thoroughly successful. For the past two weeks they have run four double-double puddling furnaces in this way, and the iron made is of very superior quality. They effect a great saving in fuel, lighten the labor of the puddler and his helper, and save a great deal of time. They are able in 1½ hours to get out the usual five heats of a 12 hours' turn. They experience no difficulty in keeping the product of the blast furnace uniform, and have thus far met with no obstacles that they have not been able to overcome. They believe they are the first to successfully accomplish this feat, and predict the inauguration of a new departure in puddling.

**A NEW METAL.**—The English correspondent of the *American Manufacturer*, in a recent letter, says: What may be termed a new metal for application to the special requirements of electrical engineering has just been brought out by Messrs. Henry Wallwork & Co., engineers, Manchester. Castings for two armatures and the other portions of a dynamo which take off the electricity are needed to be of a metal perfectly uniform and even. Messrs. Wallwork use a special mixture and employ a special process of melting, under which the whole operation is carried through one temperature. The result of their experiment is, they claim, a soft metal which has the virtues of a wrought metal and is absolutely uniform in texture. It has been used already for many electrical castings with satisfactory results.

**ANOTHER ALUMINUM BRONZE FACTORY.**—We note that E. Smith of the copper and brass works, Chicago, has started to make aluminum bronze castings. It is interesting to note the rapid progress that is being made in this important branch of industry, from which it is to be hoped the time is not far distant when this valuable metal, a substance of full 40 times the transverse strength of brass, and equal in tensile strength and ductility to the best grade of tempered steel, will be placed upon the market at a price which will make it available for introduction into a great number of important uses.

**GEARING ON BELTING.**—In England the practice of transmitting power from engine to shafting has seemed likely to be almost entirely superseded by rope driving. Now, however, by the use of improved machinery for cutting the teeth of spur gears of large size, they are enabled to use much better gears than formerly, and it seems not improbable that there may be a return to the use of gears for such purposes.

**ELECTRO DEPOSITED STEAM PIPES.**—By a method, practiced in England, for making copper steam pipes, the copper is electrically deposited in the proper form, doing away entirely with brazing. This has been done before, but the strength of the copper has been destroyed. This difficulty is said to have been obviated and copper pipes of great strength obtained.

**TIN FOIL MANUFACTURE.**—An extensive building for the manufacture of tin foil is about to be erected in St. Louis by James Johnson, formerly of the Missouri Lead Company. Large quantities of lead will be consumed to meet the increasing demand for tin foil by tobacco manufacturers, brewers, etc.

## SCIENTIFIC PROGRESS.

## Labor and Food.

The human body never ceases to work. Even in the most profound slumber some of the functions of life are going on, as for instance, breathing, the circulation of the blood, digestion, when there is food in the stomach; and it follows that some part of the nervous system is therefore awake and attending to business all the day and night long. In the act of living, some of the substance of the body is being constantly consumed. The amount of work done by the heart in one day in propelling the blood is now estimated as equal to the work of a steam engine raising 125 tons one foot high, or one ton 125 feet high. We lose in weight by working. Weigh a man after several hours' hard labor, and he will be found two or three, and in extreme cases several, pounds lighter. If we do not wish to become bankrupt, we must replace by food the amount we have lost by labor. Hunger and thirst are the instincts which prompt us to do this. They are like automatic alarm clocks, which stop the engine at various points to take on fuel and water.

In a healthy man as much is taken in as is required to maintain the weight of the body against loss. Nature keeps the account. On one side is so much food spent in work; on the other, so much received into the stomach for digestion. They should balance, like the accounts of an honest book-keeper. In an unhealthy person, the instinct of hunger becomes disordered and does not sound the alarm, and so the person goes on working without eating, until he becomes emaciated; or the instinct works too frequently, and he eats too much and clogs the vital machinery. A calculation of the business done in the body reveals the fact that for a hard-working person about 8½ pounds of food and drink are used up daily; some bodies use more and some less, but this is the average. The profit which the body gets on the transaction has been calculated, and may interest our readers. The energy stored up in the 8½ pounds of food ought to raise 3400 tons one foot high. Most of this energy, however, is expended in keeping the body warm and its functions active. About one-tenth can be spent in our bodily movements or in work. The profit, then, on the process is about 10 per cent. This is enough to raise 340 tons one foot high each day—a profit which is quite enough for earning a good living if rightly expended, and it is probably more than most make, but all ought to strive to reach this point if possible.—*Medical Record*.

**IS CLAY A MINERAL?**—A most curious suit was recently presented before the English House of Lords for adjudication, in which the above question was the issue. The corporation of Glasgow purchased some land at Westham for water works and conduits, and erected thereon a reservoir. In the deed there was a clause included that stipulated for the seller a reservation of "the whole coal and other minerals." Coal seems not to be present underneath the reservoir, but merchantable clay is there, and to it the representative of the original vendor lays claim. The land in the immediate vicinity has been worked for clay almost up to the boundary of the reservoir, and the right of extending the workings regardless of their effects upon the corporation's structures is claimed. Various decisions have been reached in the Scotch courts, and now the case has at last reached the final tribunal. The contestant offers to relinquish his title to the clay for the modest sum of £10,000, only £1000 less than he originally received for the property. The scientific fact that clay is a mineral is admitted, and also under the Railway Clauses Act, it is conceded that it may be considered such. The Scottish courts present at least a majority of opinion against the corporation. The point that clay is an ore of aluminum strongly indicates that it is in the economical sense a mineral. It will be interesting to see whether the Scotch hailies will prove to have been outwitted by an over-clever seller.

**A UNIVERSITY FOR CHICAGO.**—Chicago is in a fair way to become the possessor of a university worthy of such a great and growing city. It appears that Mr. Harry Farber (a relative of Mrs. Cleveland), who is at present studying law in Vienna, has offered to Minister Lawson, U. S. Envoy to the Austro-Hungarian Court, the munificent sum of \$1,000,000 for the purpose of establishing in Chicago a university planned upon the principle of those which govern similar institutions in Germany and Austria.

**FOR THE CONCEALMENT OF TORPEDO BOATS.**—A series of experiments has been made at the Rochefort Arsenal, France, with a view to provide for the concealment of torpedo boats in action. The apparatus used prevents the escape of sparks and fire, and it is said that it reduces the temperature of the smoke to 100°, at which temperature, instead of rising, it spreads over the surface of the water, concealing the boat.

**A PECULIAR BOILER DEPOSIT.**—A correspondent of the *Stevens Indicator* writes as follows in a recent issue: One of a battery of boilers at an iron plant was painted inside with a mixture of graphite and linseed oil. The boiler was filled with water and stood idle for several

months, when it was put in use. Being troubled seriously with priming, the boiler was opened and a rather curious deposit was found. It consisted of masses of an irregular spherical form, porous and spongy in structure, ranging from one inch to six inches in diameter. They were soft and held a large amount of water in suspension, which could be squeezed out as from a sponge; color, a dark lead, which became lighter as they dried out. On drying, the masses became hard and friable, but still retained their porous structure. When gently heated in a crucible, fumes were given off, and the mass became reduced to a powder of about one-tenth its original volume. A cold glass plate held in the fumes showed a deposit of water and oil, which, with the characteristic smell and aforementioned circumstances, proved to be linseed. A chemical analysis of the residual powder proved the presence of graphite in large quantities, and small quantities of calcium, magnesia, iron and aluminum. Before being put into use again the boiler was painted inside with a mixture of crude petroleum and graphite, and no further trouble was experienced.

## Electric Sunstroke.

Under the above heading *Engineering* of London directs attention to a paper recently read before the French Society of Surgeons by M. Defontaine, doctor-in-chief to the Crensat Steel Works. M. Defontaine states that workmen employed in operating the electric forges at Crensat are subject to a form of sunstroke, which he attributes to the intense light radiated from the focus of the forge. Ordinary arc lamps are incapable of producing such effects, as the light is not sufficiently intense, but these forges emit a light of more than 100,000 candles from a few square centimeters of surface, producing on men exposed to their glare physiological consequences previously unheard of. Frequently, after two or three hours' work, the men complain of pains more or less intense in the neck, the face and the forehead, simultaneously with which the color of the skin is changed to reddish-brown. Further, in spite of the precaution taken by the men of shielding their eyes with dark glasses, the retina is affected to such a degree that for some minutes after ceasing work the operatives are totally blind to all objects illuminated with common daylight, nor is perfect vision restored until nearly an hour after. The conjunctiva are irritated, and remain in a state of congestion for 48 hours, and this is accompanied by a painful feeling as of some foreign body introduced under the eyelids. The secretion of tears is augmented, a constant flow being kept up for 24 hours, during which the patient suffers from insomnia, due to pain and the abnormal flow of tears, and possibly also to fever. During the following days the skin peels off the face and neck, which become of a deep red color, fading away about the fifth day. In cases of ordinary sunstroke heat may have some influence, but in those considered above the whole effect is due solely to the action of an intense light.

The value of the observation lies in its suggestion as to the way in which sunstroke of the indicated type is produced. It suggests, for instance, that the whole matter may be a question of the rapidity of the vibrations originated by the luminous body, whether those that are known under the name of light or those slower ones that are described by the word heat. Molecular changes in the system due to heat, or light, or both, produce in some way not yet definitely explained the affection known as sunstroke. Whatever throws light on the conditions or nature of these changes helps to clear up a very obscure and puzzling subject, specially related to the functions of the nervous system, and hearing at the same time on the mechanics of ethereal vibrations. Heat, light and chemical effect are all connected, and very possibly all involved in this particular problem. It offers magnificent possibilities for students who have the courage and patience to attack it.

**MODEL OF AN EARTHQUAKE.**—The recent study of earthquake phenomena has led to quite a multiplication of mechanical devices for determining the character and extent of the earth movements caused by such disturbances. The latest is described in a recent number of the *Journal of the Science College of the University of Tokio*. Professor Sekiya describes a very curious and remarkable model he has made to exhibit the manner in which a point on the earth's surface moves during an earthquake. Those who have followed the recent progress of seismometry in Japan are aware that the motion which is recorded at an earthquake observatory is a prolonged series of twists and wriggles of the most complicated kind, so that the path pursued by a point on the surface of the soil has been aptly compared to the form taken by a long bank of string when loosely raveled together and thrown down in a confused heap. Professor Sekiya has taken advantage of a very complete earthquake record obtained by him with a set of Professor Ewing's seismographs to follow out this path step by step, and to represent it in a permanent form by means of stiff copper wire. The earthquake he has modeled in this way took place on Jan. 15, 1887, and was unusually severe for Japan. The model represents the absolute motion of the ground magnified 50 times, and shows at a glance the real character and enormous complexity of earthquake motion.



## USEFUL INFORMATION.

## How to Prepare Rouge for Polishing Metals.

As the rouge found in the market does not meet with the requirements of the workmen, at least for every metal, observes the *Universal Tinker*, we give a very simple metal which allows the workman to prepare for himself just the quality and quantity necessary for his particular work. Heat sulphate of iron of as pure a quality as can be obtained (also called green vitriol) in an iron vessel over a slow fire, stirring it continually with an iron spatula until it is dry and takes the form of a pale greenish-yellow powder. This powder, after being crushed in a mortar and sifted, is to be calcined in a new crucible and exposed to the fire of a smelting-stove as long as vapors arise from it. As soon as no more of these can be observed the contents of the crucible may be left to cool, and when cool will appear like the rouge used for polishing. Its color may vary from pale red to brown-red, or even to blue or violet, but these variations arise only from the different degrees of heat employed, and it may be observed that the higher the temperature has been during the process, the darker the color and the powder—a fact which also explains why the pale-red powder is used only for gold and silver, while the violet is used for steel. No matter what the color is, it is very important that the rouge be well bruised and washed in water before it is used. For this purpose three clean glasses are taken, and one of them is filled with pure water, in which a part of the rouge is mixed by stirring it for some time with a small piece of wood. After allowing about half a minute for the rouge to settle to the bottom of the glass, the remainder of the red liquid is decanted into the second glass, but every particle of the deposit must be left in the first one. The same process has to be observed also for the second and third glasses, but with this difference: the powder in the second glass is allowed to settle about two minutes, while in the third one it is left for several hours, that is, until the water resumes its natural clearness. The sediment of the first glass is almost valueless, that of the second of medium quality, but that of the third glass is of very good quality and fit to be used with great advantage after it has been slowly dried. In some cases the rouge thus obtained may be mixed with grease, and generally it will be found of great advantage to moisten it with spirits of wine and burn it in a clean iron vessel.

## A New Process of Veneering.

*La Construction Moderne* gives a few interesting details of a new process of veneering with all descriptions of wood, etc., which may be of interest to manufacturers. It is said that these veneers fully preserve the appearance and qualities of the massive wood. The veneers are pasted on strongly resisting sheets of paper and in that state sold to the trade. These veneers can be handled quite as easily as tapestry paper, and are useful for various purposes. They have all the qualities of the wood in full size, and can be quite as easily washed, varnished, etc. The mode of application on surfaces is very simple, but a certain amount of care is, nevertheless, required, especially when great duration of work is desired. All the grooves and fissures, etc., must first of all be filled up with putty of a good quality, or plaster if it should be a wall. If the wall is new, it must be washed with a warm solution of glue (1½ pints of glue paste to 14 pints of water). When the glue is dry the wall may be polished with emery paper. If the object has already been papered, the old paper must be removed before the veneer is applied. In cases where the object has been painted, it would be necessary to rub the paint with rough emery paper first and polish it with the finest kind afterward. No coating with glue is required on the paint. A small quantity of flour paste must then be applied to the surface prepared in this manner by means of a piece of muslin. The stuff should be applied dry, and smoothed with an equally dry brush. When these operations are completed the veneer is moistened with the water, to which glycerine in the proportion of one to sixteen parts is added, in order to soften the wood and give it a great suppleness when once dried. As soon as the wood has swollen uniformly enough it may be cut out in different sizes as required. The surface about to be veneered is then coated with glue, and the veneer then placed in proper order. They are then slightly pressed in order to expel the air. A piece of pine or cork wood may be used for that purpose. All the joint parts must be juxtaposed and not allowed to overlap, and all the paste must be carefully wiped off. As soon as the wood is dry all the stains that may have been made in these manipulations should be removed by washing with a weak solution of oxalic acid in water (one teaspoonful of acid in 1½ pints of water).

**THE PROBLEM OF THE BOOMERANG.**—An exhibition of boomerang-throwing was recently given by a party of Australian natives at Munster before some German scientific men who are endeavoring to discover the cause of the boomerang's curious flight. The instruments were of two sizes, the larger being a slender orecient about two feet long, 2½ inches wide and one-fourth inch thick, made of an ex-

ceptionally heavy Australian ironwood. This boomerang was jerked up into the air about a hundred yards, when it flew straight away, then turned to the left and returned in a curved line back to the thrower, whirling around constantly and whizzing unpleasantly. One badly directed projectile passed through a spectator's hat with a cut as clean as that of a razor. We have not heard what conclusions the German scientists have come to, or whether they have satisfactorily solved the problem; but, according to a German manufacturer, who has made some 11,000 toy boomerangs, the mystery of the movement lies in the shape, the boomerang having a sharper curvature in the middle, with unequal length of the two arms, which must be made of equal weight by unequal thickness. The peculiarity of motion is said to be due to the difference in the length of the arms, which diverges the curve of rotation from the circular.

**A ZINC CEMENT.**—Oxychloride of zinc cement or mastic is prepared by mixing one part of the finest pulverized glass with three parts of oxide of zinc thoroughly calcined (made from the carbonate), which is afterward kept in well-stoppered glass vials. Separately one part of borax is dissolved in the smallest possible quantity of water, it is mixed with a solution of chloride of zinc of 15-1.6 sp. gr., and is kept in this state in well-closed vials. To use this mastic, enough of the powder is mixed with some of the liquid to form a putty, which hardens readily until like stone. Under the name of "Paris dental cement" a similar preparation is sold in the pharmacies which has even been used for filling hollow teeth. This composition can serve excellently for many other purposes; for example, to attach to each other different parts of technical, scientific or domestic appliances, where a tenacious, quickly hardening cement is required. —*L'Electricite*.

**LAND IN CHINA.**—Land in China is divided into more holdings than any other land in the world. It takes but a very small piece of land to support a Chinese family. The Chinese are the closest and most thorough cultivators in the world. Field hands in China are paid \$12 per annum. The food is cooked by the employer. With his food he is furnished straw, shoes and free shaving—the last a matter which a Chinaman never neglects for any great length of time where it is possible to secure the luxury. It costs about \$4 a year to clothe a Chinaman. Much of the land in China is divided up into gardens of areas as small as one-sixth of an acre.

**A POWDER FOR THE FEET.**—A powder is used in the German army for chafing the shoes and stockings of the foot soldiers. It is called "Fusel-pulver," and consists of three parts salicylic acid, ten parts starch, and 87 parts pulverized soapstone (Speckstein). It keeps the feet dry, prevents chafing and rapidly heals sore spots. It is to be recommended to mountaineers.

## GOOD HEALTH.

## The Pain of Freezing.

A party of Minnesota people during the recent extreme cold weather in that region started out on an expedition for hauling logs. Just before dark the party arrived at the place where their work was to be done, and after making themselves comfortable, as stated by one of the party, with a good supper and a blazing log fire, all four lay down to sleep on a bed made on the snow, with a thin layer of hay on top of some boards, and were well wrapped up in blankets. During the night the temperature changed to a terrible cold, the thermometer falling to 45 degrees below zero, as we learned afterward. Had we known this and kept our fire burning, there would, of course, have been no danger; but, being very comfortable, we all fell asleep early in the night and were unconscious of the danger we were in until awakened by the pain of intense cold, and then we were already so overcome with the cold that we lacked power or energy to get up or even to move.

Comparing notes afterward, we found that all had experienced a like sensation, namely—first, an acute pain, like the point of a needle in every pore, but free from all mental anxiety, except a dull conception of something wrong and a desire to get up, but without sufficient energy to do so. This feeling, however, did not last long, and subsided gradually into one of quiet rest and satisfaction until consciousness ceased altogether, and without any struggle or pain, either bodily or mental. We had all reached that stage, when, by an accident, the arm and bare hand of one of the party, who lay on the outside, fell in the snow. This started the circulation in his body, and gave him such intense pain that he quickly aroused himself and got on his feet, and of course we were all saved. It took a long time before we could use our limbs sufficiently to rebuild the fire, and during that time we suffered much more pain than we had before. I am satisfied from that experience that a person perishing in that way has a very easy death, because he sinks gradually into a stupor, which blunts his sensibility both to physical pain and mental agony long before life becomes extinct.

It was about 50 degrees in the morning when we got up. We did not lie down again or at-

tempt to haul out building logs, but started in a few hours on a bye line for a ravine that would lead us back to Red Wing. It was a struggle of life and death to get across the rolling prairie, and had the cold been accompanied by a blizzard, we could not have gone across.

**PRESERVING BEAUTY.**—Some odd-minded investigator, who has spent a deal of patient labor in the search for means whereby women may preserve their beauty, has made an important discovery relating to one whom he calls the handsomest woman he ever knew. She was over 30 years of age when our savant first made acquaintance with her, but, as he asserts with much emphasis, no girl of 16 ever had rosier cheeks or brighter eyes. He made haste to learn her inestimable secret, and here is a summary of his report: She was naturally a fine-looking woman, but the attention which she gave to matters of hygiene enhanced and preserved her physical attractiveness. What did she do? Well, among other practices, she took a sponge-bath every morning; was particularly about the ventilation of her apartments, particularly her sleeping-room; took long walks whenever she could; ate little meat and much fruit and cereal food, and drank her coffee without sugar and cream. To preserve the suppleness of her figure, she practiced standing one hour every day, 15 minutes at a time, with her hands on her hips before a long mirror. In that position she bends the knees outward and sinks slowly to the floor, or as near it as possible, meanwhile moving her arms in any direction to the utmost length, out or up, forward or backward, until she resumes the erect position with hands on hips. Each movement is repeated, accelerating the speed a little until, at the end of 13 minutes, it is done very rapidly, and a fine color is in her face. She then lies down on a flat couch without a pillow and rests until her breath becomes normal and regular, as it will in the two minutes left of her 15. It is easy to see that her whole body thus receives good exercise, which adds to the grace of her form, beautifies her complexion by cunning nature's own means and makes her strong and healthy.

**EFFECT OF DUST ON HEALTH.**—The injurious effects of certain industries upon the health of employes, arising from the dust involved, are especially felt, according to a report made to the British Parliament on the subject, by corn-millers, meltsters, tea-handlers, coffee-roasters, snuff-makers, paper-makers, flock-dressers, feather dressers, shoddy-grinders, weavers of coverlets, dressers of hair, hatters in certain departments, dressers of colored leather, workers in flax, dressers of hemp, some workers in wool, ware-grinders, masons, iron miners, lead miners, grinders of metals, file-cutters, machine-makers, makers of firearms and button-makers. To these may be added colliers, who suffer from lung diseases in ill-ventilated mines; potters, especially the class called flat-pressers, in whom emphysema is so common that it is known as the potters' asthma; the china-courers, who all, sooner or later, become asthmatical from inhaling the light film dust in suspension; pearl button makers and pin-pointers, who suffer from bronchitis and hæmoptoe; the makers of grindstones, Portland cement, etc. How the white-lead industry came to be omitted from the list is inexplicable. —*Ex.*

**OVERWORKED RAILWAY MEN.**—As a result of recent accidents which it was clearly demonstrated were caused partly if not wholly by overwork and excessive hours of labor of engineers, it has been ordered that no enginemen of the Great Northern Railway, England, shall be allowed to go on duty without having had an interval of at least nine hours' rest. This is a wise provision and one that should be generally enforced, not only for the good of the men, but for the safety of the traveling public as well. Movements in the same direction are also being made in several States of the Union. The overworking of street car conductors and drivers is fraught with much danger—especially on cable-car and dummy lines.

**COMPARATIVE CONSUMPTION OF TOBACCO.**—M. Paul Leroy-Beaulieu gives figures showing the quantity of tobacco consumed in the different countries of Europe. The rate per 100 inhabitants is, according to him, as follows: Spain, 110 pounds; Italy, 128 pounds; Great Britain, 138 pounds; Russia, 182 pounds; Denmark, 224 pounds; Norway, 229 pounds; Austria, 273 pounds.

**CAN A MAN COUGH HIMSELF TO PIECES?**—A London coroner has raised the question whether a man can cough himself to pieces. A broken rib was found in a deceased lunatic, when medical evidence was brought forward to show that under certain abnormal conditions bones may be broken by muscular efforts or even by a violent fit of coughing.

**ELECTRICAL MEDICATION.**—According to the *Electrical Review*, medicine may be introduced into the human system by electricity. The electrodes of a battery are saturated with the medicine and applied locally to the skin. Experiments show that there is an actual absorption of the medicine into the system.

**ABDOMINAL MASSAGE** has been successfully applied by Dr. H. Sabli, of Berne, to the cure of constipation. His patients are recommended to roll a five-pound cannon-ball over the abdomen for five or ten minutes daily.

## The Lumber Business of the Pacific Coast.

The lumber business of the Pacific Coast has already developed into magnificent proportions, and is still growing at an annealingly increasing rate which bids fair, at no distant day, to constitute the largest local interest of the kind on the entire continent. It seems to have taken a new start during the past few years.

The census of 1880 gave, in round numbers, 693,000,000 feet as the cut of that year on the Pacific Coast. Of this amount California contributed 305,000,000 feet, Oregon 177,000,000, Washington Territory 160,000,000; the balance, 51,000,000 feet, was contributed by Idaho, Nevada and Arizona—the last-named furnishing nearly 11,000,000 feet.

Since 1880 Washington Territory, in which is located the great lumber region of Puget sound, from being the third on the list has made a wonderful development and leads by far all other localities. We append a rough estimate as the figures for 1887:

	Feet.
Washington Territory.....	600,000,000
Oregon.....	300,000,000
California.....	400,000,000
All others.....	70,000,000
Total.....	1,370,000,000

These figures show a wonderful increase in the lumber business of this coast during the first seven years of the present decade, the yield having practically doubled in that time.

About one half of the total lumber produced of the coast has long been consumed in California, and the present boom in Southern California has largely increased the consumption during the past year. It is estimated that about one-half the entire lumber used in the State during the last half of 1887 was consumed in the three southern counties. As there is every reason to believe that the great influx of newcomers into the State will continue in an increased ratio for several years to come, we may look for a corresponding increase in the lumber business. People that are coming here must have homes, and our lumber-mills will be taxed to their utmost to keep up the supply. To do this the capacity of existing mills must be largely increased and many new mills must be built. The increase of production during the last year has been about 200,000,000, or a little over 17 per cent. As the influx of people coming to stay is now spreading over the entire State and the numbers greatly increasing, we may reasonably look for a lumber famine for a year or two to come. Either this or our foreign trade must suffer. This last would be a misfortune, as our foreign and Eastern lumber trade promises to be one of the great trades of the future, and one which we ought to nourish with great care. The mills now in operation will be utterly unable to supply the demand, and in all probability it will be impossible to put in operation new mills sufficient to turn out a supply sufficient to meet the urgent necessities of our rapidly growing population. It is a fortunate fact, however, that

## Our Forest Supplies

Are equal to the most urgent demand which can be made upon them. We have, first, immense lumber regions, which may be opened up all along the western slope of the Sierras and Rocky mountains by lateral railroads, which may be easily rushed up into their canyons from main lines at innumerable points. These mountain trends along the Pacific Slope from the northern to almost the extreme southern boundary lines of the Union—a distance of some 2000 miles, and are covered for nearly their whole extent by immense forests of the finest timber on the continent. Then we have the Coast Range with even a much larger supply. The average width of this latter range cannot be less than 25 miles by a length of about 2000. Passing on northward and beyond British Columbia, we have in Southern Alaska another forest stretch of absolutely unknown area, probably nearly or fully equaling the two areas already noticed. All this timber is readily approachable by ship or rail, and will all be eventually converted into serviceable values. It has been estimated that when all the available timber in the regions south of British Columbia is converted into merchantable lumber, its market value cannot be less than \$20,000,000,000 or \$25,000,000,000, when placed at tidewater. There is no doubt but that amount of money will be realized from it in the near future by those engaged in the industry. It is almost impossible for the mind to comprehend such immense values. The amount named is fully two-thirds of the assessed valuation of all the property in the United States at the present day. The *San Francisco Journal of Commerce*, in alluding to the magnitude of the forests of the Pacific Slope, says: The principal descriptions of lumber that go to make this up are the pine or red fir, the redwood, the cedar, and the sugar-pine. The pine or red fir is found west of the Cascade range, between 44 and 52 north latitude, 8° or 560 miles in length. All the country round the basin of Puget sound, except in the few clearings, is covered with its steadily growth. The redwood is king from 37 to 42 north latitude, and takes in 4125 square miles. Great tracts are covered with trees 200 to 300 feet in height, and a redwood forest is one of the most majestic sights in the world. The cedar is found wedged in between the redwood and the sea from 40° to 42°. The sugar-pine is the most valuable timber found in the Sierras, and is present in almost inexhaustible quantity.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**PROSPECTING.**—Amador *Ledger*, March 3: Two brothers, Chris and Eric Emsley, have been prospecting in the vicinity of West Point bridge, on the Amador side of the river, for the past few months. They have run a tunnel on a claim adjoining the Tirakoff mine, a distance of 40 feet, and have within the past few days struck a vein 14 inches wide of exceedingly rich ore. It shows free gold all over it, and prospects over \$100 to the ton. Col. Robinson had a large lot of milling machinery hauled to the Calaveras bank of the Mokelumne river opposite the Cleveland mine, for transportation across the river, to be erected on the Cleveland. The milling plant was purchased in Calaveras, and it was considered the easiest method to get it to the mine to haul it across by raft. The mine is very difficult of access by wagon. The Bunker Hill mill is in part supplied with ore from the ledge struck on the Mayflower ground, between the mill and Bunker Hill shaft. The rock is said to be of excellent quality. The extent of the ledge is not yet known, but it is thought likely that this discovery will place the Bunker Hill Co. on a solid basis of prosperity. The ledge is reported by mining men to look better than any discovered on this property for years.

**ZEILE.**—Amador *Dispatch*, March 3: We understand that the Zeile Mining Co. are considering the matter of sinking a new perpendicular shaft 1000 feet deep, east of the present main shaft; and it is thought by some that Supt. Detert's present visit to San Francisco is, in part, to consult with the principal members of the company upon the proposition. A step of this kind would no doubt be a judicious one, as it is said there is an immense body of ore at the bottom of the present works, about 900 feet, and of a somewhat better grade than that above. Of course the undertaking would be expensive, but would be much easier kept in good condition than the incline shaft now in use, the timbers of which have to be frequently replaced owing to the great heaviness of the ground.

#### El Dorado.

**TAYLOR.**—Georgetown *Gazette*, March 3: The Taylor mine is running on a limited force; the lower levels have a fine ore body of more than 300 feet exposed. The stamps of the new mill are dropping on fine rock, with highly satisfactory results. New self-feeders to the mill and additional machinery has been added to the mine. Mr. Chester, who is one of the principal owners, is giving his personal attention to the working of the property.

**GRIZZLY FLAT.**—Cor. Placerine *Observer*, March 1: Our town is dull when in fact it ought to be one of the liveliest camps in the county. We have a great many and a variety of quartz ledges large and small, all of which, or nearly all, are at present non-producers, simply for the want of proper process for working the ores. At and near the surface, varying in depth according to elevation, the ores were all desulphurized by action of the elements and paid well by common mill process. But at water-level, while the ledges continue down in size and are well defined, the ore becomes a sulphid and rebellious, and the gold cannot be saved by the wet battery and galvanized copper plates. I will mention in this connection the Stillwagon mine which paid its original owners largely until they reached water level and consequently rebellious ores. While the ore would give an assay value on an average of \$65 per ton, not more than \$6.50 could be saved by common mill process. Then why not change the process? Put up a furnace with capacity of one ton per day. Crush the ore dry, roast, chlorinize, or use pans or any other process by which the gold can be taken out after the ore is roasted, and take as much bullion out of one ton of ore as they now do out of ten tons. This would not only be a great saving of the mine, but in expense. For instance, the difference between the cost of taking out one ton of ore and ten tons. The cost of mining, crushing dry, roasting and chlorinizing on the ground would not exceed \$25 per ton, giving a net product of \$45 per day from one ton of ore. There are many such mines hereabouts. I could name them by the dozen that would pay fortunes by the proper process of working. When men represent these rich sulphid ore mines to inexperienced capitalists as large free-milling ore propositions, they are doing themselves and the country an injustice. At the same time there are fortunes in this class of mines.

#### Nevada.

**AN OLD MINE RELOCATED.**—Grass Valley *Tidings*, March 1: The old Pittsburg claim, situated at Deadman's Flat and adjoining the Eastern Star mine on the south, has been relocated by P. H. Paynter, T. H. Wilhelm, C. E. Clinch and Wm. Larimer of this city. An extension of the Pittsburg has also been located by these persons. There is a shaft almost perpendicular, 150 feet in depth on the Pittsburg, sunk by McCook Bros. & Co. many years since. Between \$40,000 and \$50,000 were taken from the mine in gold while it was operated. A long and costly lawsuit, followed by other embarrassments, resulted in the abandonment of the property. A small force of men are now cleaning out the old shaft; this done, development work will follow.

**GOOD CLEANUP FROM THE BANNER.**—Nevada *Transcript*, March 3: A crushing of 22 tons of ore from the Banner has just been made and the average yield was \$22 a ton, which is about the amount the ore paid when the old mine was in its early-day glory before the pay chute was lost. This ore came from the vicinity of the former workings, there having been discovered in the footwall an eight-foot ledge of solid quartz that was not seen by the original owners. A crosscut is being run to tap the new ledge quite a distance beyond where the crushing has been extracted, and if the formation holds its present thickness and quality to the point where the crosscut should reach it, the Banner will again become one of the leading bullion-producers of the country.

**WASHINGTON TOWNSHIP.**—Cor. Nevada *Transcript*, March 3: Some very rich rock is now being taken out of the Bluebell mine. The ledge is 8 feet in width, and as greater depth is reached the rock

grows better. A rock-breaker is soon to be put in place at the mine, which will greatly facilitate the banding of the ore. Ten or 15 more stamps will be added to the mill in the near future. The Bluebell mine as far as developed proves to be one of the most favorable prospects in this district. It is now more than likely that in a very short period of time the celebrated Eagle Bird mine will again be put in operation. Al. McKee is engaged in prospecting a ledge further east which shows some fine-looking quartz. The old stand-by, the Yuba mine, never showed up so well as at the present time. On the 500-foot level the ledge is from 10 to 11 feet in width, and in many places it is very rich in free gold and sulphurets. The 25 stamps are kept hammering away night and day without cessation. The result is a steady stream of gold. Heretofore the pay chute in the mine was supposed to be pitching south, but later explorations developed the fact that the rich lead that they now are following up pitches north, which is considered much more favorable for the permanency of the mine. Ole Helgeson, Chris Anderson and Martin Vandenberg are now engaged in erecting a small four-stamp mill, for prospecting purposes, on the Daylight quartz mine, situated on Holbrook Flat a short distance below the Yuba mine. Their material is now all on the ground and it will not be a very long time before the company will be ready for business. Their ledge is from two to four feet in width and the rock prospects rich in free gold. The Golden Gate, better known here as the Rodda ledge, has recently been relocated by other parties, and hereafter it will be known as the Ormonde quartz ledge. The Washington mine is looking exceedingly favorable in all its departments. At the 100-foot level the drift south is now in a distance of nearly 800 feet. The ledge in places is 14 feet in width and some of the rock shows very rich in free gold. At the 200-foot level drifts have been run a short distance on the ledge both north and south, uncovering a good-looking body of ore eight feet in width. The 20-stamp mill is kept steadily running night and day without intermission. It is only a question of time, and a short time too, as to when the Washington mining district will prove to be the greatest gold bullion-producer of the State.

#### Placer.

**OPHIR.**—Placer *Herald*, March 3: At present there is but little work doing on the ledges. Messrs. Shurtliff and Robinson, after an interval of inaction of several months, owing to lack of water-power, have begun work. The water has been pumped out of their shaft in the Doig mine, and the present indications of rich pay rock are very flattering. Last season according to report they took out \$60,000 from this mine. Kidd and Johnson, owners of the Pioneer quartz-mill, are operating their mine but have not had the time or the water yet to prospect it. They have refitted the mill and are doing custom work and expect to run the year round. Nothing is doing on the Bowlder mine. The Butts mill is idle just now. Mr. Pelster's mill is running on good rock taken from the Rock Creek mine.

#### Plumas.

**GRANITE BASIN.**—Plumas *National*, March 3: Joseph Peppin of Granite Basin says the Basin is in a flourishing condition. He worked three tons of rock last week for Mr. Christie, from the Christie ledge, which paid \$400, and said Christie panned \$150 out of the rock. It would have paid \$150 per ton before the richest of the rock had been selected and worked. Swan & Co. have not started their mill yet, but will in a short time. W. C. Graves has a four-stamp mill on his claim, which will be put in running order as soon as the snow disappears. See & Jolly have plenty of good rock and will start their mill as soon as the weather moderates. John Chatty is running an arastra on his claim in the upper end of the Basin.

#### Shasta.

**IGO.**—Cor. Shasta *Courier*, March 3: Robinson & Son have found a chimney of good ore on the surface, about 500 feet north of their Black Prince shaft. Jake Blank is running his arastra on N. Manzanita ore, and ore taken from a ledge at the head of Bogus gulch. J. P. Wright's shipment of sulphurets was satisfactory. He is running a lower tunnel, and retrimbering the upper works. Shirland Bros. are taking out good ore at the Pacific and crushing the same in their arastra. E. L. Ballou's arastra is running on Hope and Manzanita ore. C. J. Russell is at work on his Centennial. Shaw & Bennett have got the Continental mill crushing ore from the Continental mine. A Shaw concentrator is to be used for concentrating. The sulphurets are to be shipped, for the present at least. C. Godfrey has been taking some good ore from the N. Hope. The Dayton is looking first-rate. The tunnel is being continued past the shaft. Rothwell is doing some work on his Confidence. P. Gibney talks of tapping his Grand Central from the Kanaka side. Wm. Lee is at work on a ledge north of the Grease Wood. Some placer mining is being done, generally with small returns.

**CHROME.**—*Courier*, March 3: It is not generally known that in Shasta county exists one of the best chrome mines in the world, but such is a fact. It is located at Shotgun creek, on the Sacramento river, on the line of the California & Oregon railroad, and not far from Sims station. The body of the material, so far as developed, shows a width of exposure of many feet, and the length of the lead is known to be great. The depth of the deposit has not been ascertained on account of having to contend with water after a certain depth has been reached, and no machinery or means of dispensing with the water have been erected, not being needed at present, as there are millions of tons of chrome above the water line. Mr. Jones, one of the owners, was in town Tuesday, and informs us that shipments of the chrome have been and are being made to the chrome works at Baltimore and Philadelphia, and the material pronounced the best yet sent to those works. The railroad company has put in a side-track and platform for the accommodation of the shippers, who have named the sidestation Chromite.

#### Sierra.

**PILGRIM.**—Mountain *Messenger*, March 3: The Pilgrim G. M. Co. will soon, if report be true, make arrangements for operating their mine early in the spring. Several more men have been put to work at Little Grizzly, 14 now getting out gravel.

#### Siskiyou.

**KLAMATH MILL.**—Cor. Yreka *Union*, March 3: Everything in shape of mining in this part of the

country is lively now. The gulches are all running full of water and along with the fine weather we are having it makes the river and quartz mining boom. A rich strike is reported in the Black Bear mine, which from all accounts is like the rich strikes made in years gone by, which goes to prove that the Black Bear is yet one of the leading mines of the State. The mill is running right along with plenty of good ore in the dump and also up at the mine. Mr. Bradley, who has charge of the Mountain Laurel mine, which is owned by A. Ball & Co. of Canton, Ohio, informs your correspondent that the mine is turning out well considering the amount of work done on the ledge direct. Yet there has been enough done to satisfy the company that the mine is a valuable one. They are running about 12 tons of ore per day at present and expect to double the amount soon. The mill under the management of Mr. Corbett has been running night and day, and after a month's run was closed down for a few days to clean up and alter one of the batteries. They will start up again the 26th. The result of the above cleanup was very satisfactory to the owners, the average of the rock milling far above that which was crushed last year by its former owners. Messrs. Bures & York of San Francisco are driving a crosscut tunnel on the Indian mine which is situated on Methodist creek. They expect to strike the ledge 100 feet deep, and from surface indications we may expect to hear of a big strike soon. The mines on Know Nothing creek are all at work, and well might they be, for it is seldom that such flattering prospects present themselves to the faithful miners as has been the case in that camp. In the past year the mines have opened up better than was expected, the result of which was the building of an eight-stamp mill by Mr. Raddelinger and a number of arastras by other mine-owners for the purpose of extracting their bullion from the rock. There is no doubt about this section of the country being one of the best mining sections in Northern California, which could be easily proven if there was a wagon-road built through from Rough and Ready to the Salmon river.

#### Trinity.

**COX'S BAR.**—Trinity *Journal*, March 3: All the placer miners are at work, but complain that the water supply is diminishing rapidly. Mr. Jas. Wallace, in the Willshire mine, is working good gravel, and with spring rains will do a good season's work. Two partial cleanups have been very satisfactory.

**EAST FORK.**—The miners on East Fork are busily at work making up for the time lost during the cold spell in January. Day & Moor are crushing ore from the Ozark. John and J. W. Bergin are running rock from the Thaksgiving mine through their arastra. The owners of the Enterprise are running tunnels and taking out rock from the ledge. They are also running a tunnel to prospect the Lone Jack; their arastra is not running, as high water injured their dam; the damage will be repaired soon. In the Golden Chest men are at work running tunnels and taking out ore. The ore is very good, carrying both free gold and sulphurets; the ledge is about 16 inches wide. The Simmons Bros. are taking good ore out of their ledge the Webfoot. The owners of the Hardscrabble have sunk a shaft to the depth of 50 feet and find the ledge growing richer with depth attained. The vein at the bottom of the shaft is six inches wide and carries extremely rich sulphurets. The ore resembles that of the Idaho mine in Grass Valley. Smith, Waters & Hubbard are working their placer mine on East Fork and are doing very well for the amount of water they have.

#### Tuolumne.

**HOMESTAKE.**—Tuolumne *Independent*, March 3: The Homestake mine at Yankee Hill, owned by Messrs. McKenna, Hale & Hastings, and leased by Mr. John Engstrom, has recently panned out another pocket, amounting to several hundred dollars. This mine was located eight years since, by Mr. W. F. McKenna, who has staid by it through thick and thin ever since. A couple of years ago, Messrs. Hale & Hastings became interested in it and prosecuted the work upon it vigorously, but without reward. For three years the labor was expended in vain. Success has at last crowned their efforts, and the Homestake promises to reward well the pluck and enterprise of its owners.

**LOOKS WELL.**—The experimental gulch mine looks well. The mill works perfectly, and hammers away without cessation, from one week's end to the other. The prospects for a good cleanup are very encouraging.

**MILL RUNNING.**—The Black Oak quartz mine near Soulsville is looking splendidly. At a depth of 200 feet the vein is from four to five feet wide, and very rich. The ore comes up black; it is full of sulphurets, the assay of which is no cause for grief. The mill is running night and day.

**POCKET.**—It is rumored that last week Mr. Jim Gillis emptied a pocket at his mine on Jackass hill, near Tuttle town, which contained the neat little amount of 20 pounds of gold-dust. Mr. Hank Gale of Sawmill Flat took out a nice little pocket of about \$300 in his claim on Friday of last week, and has been doing well ever since. Report has it that Dave McDonald of Tuttle town has been doing some good work in his mine on Jackass hill, and one day last week unearthed the shining metal to the tune of 15 pounds of gold. Tuttle town has many good mines that only await development to yield a golden harvest.

#### NEVADA.

##### Washoe District.

**CROWN POINT.**—Virginia *Enterprise*, March 3: No. 1 east crosscut has been advanced 20 feet during the week; total length, 73 feet; No. 2 crosscut east is in 95 feet. Both are in favorable vein matter. A crosscut has been started on the south line. It is in 24 feet in soft porphyry and clay, and shows a small flow of water. The 600 drift is now out 280 feet.

**HALE AND NORCROSS.**—Since the last report the south drift on the 400 level has been advanced 40 feet, and the north drift 45 feet. The east crosscut from the south drift has been advanced 35 feet in quartz, 12 feet of which is in fair-grade ore. The west crosscut has been advanced 29 feet in quartz, and has reached the west clay of the vein. In the north drift, 100 feet north from the main west drift, have started west crosscut No. 2 and advanced it 50 feet in favorable vein material. On the 700 drift northwest from the top of the north upraise has been

connected with the south drift from the Savage 600 level. These drifts show the continuation of the 700 level ore body 125 feet north from the north upraise. The south upraise has been extended 20 feet, being now 108 feet above the track floor. Have started a drift north from the top of this upraise, and advanced it 27 feet. It continues in fine ore. Are shipping the usual quantity and quality of ore to the Vivian mill, which is about 40 tons per day. Bullion on hand, \$27,000.

**SAVAGE.**—Since last report the south drift on the 400 level has been advanced 74 feet and connected with the south drift from the 500-level upraise. This connection has greatly improved the ventilation of the mine and facilitates the extraction of ore from this level. Are extracting from the several levels between the 400 and 900 about 140 tons of ore daily, which is being reduced at the Mexican mill. The car samples average \$33 per ton. Bullion on hand and previously shipped for this month about \$50,000.

**BEST AND BELCHER.**—The main north drift has been extended 44 feet; total, 569. The formation is quartz, giving low assay values. The west crosscut from the top of the upraise has been advanced 33 feet, and cut into west clay. From this west crosscut, near the upraise, the north drift has been advanced 11 feet. The formation is wholly quartz showing some value. Opposite the north drift a south drift has been advanced 13 feet. The face is in quartz showing value.

**OCCIDENTAL.**—In the upper tunnel No. 1 upraise, 35 feet above the tunnel, the south drift has been extended 15 feet; total, 30 feet. On the 100 level, in No. 2 upraise, 50 feet below this level, are cutting out a station. Sixty-five feet below the 200 level the north drift has been extended 5 feet; total, 20 feet. Have extracted 45 tons of fair-milling ore during the week.

**BELCHER.**—The 500 east crosscut is now in 95 feet, having advanced 25 feet during the week. Have temporarily stopped the 400 south drift, and started a crosscut west on the 500 level on the Belcher and Crown Point line. Both the east and west crosscuts are in favorable-looking vein material. The Sutor drift is out 1300 feet.

**GOULD AND CURRY.**—On the 250 and 300 levels have extracted during the week 120 tons of fair-grade milling ore, which is stored in drifts in the mine. On the 1300 level the south drift from the east drift has been extended 41 feet; total, 377 feet. The formation is porphyry showing some value.

**UTAH.**—East crosscut No. 3, opposite west crosscut No. 2, has been extended 51 feet; total, 64 feet. This crosscut has passed through four feet of quartz and the east clay wall. The face is in east country rock and free from water. From this point will start an upraise and later drift west through the vein.

**CHOLLAR AND POTOSI.**—Prospecting work is being vigorously pushed on the several levels of both mines above the 550 level. The ore reserves are yielding steadily and the mill is running splendidly. Progress is reported in the several drifts, without any particular change to note.

**BALTIMORE.**—The developments on the 380 level are not yet sufficient to demonstrate the extent and value of the ore recently struck at that point. The machinery is working well and handles the water readily. Work progresses actively.

**ALTA.**—Are sinking a new shaft, 250 feet east of Keystone shaft, on the Keystone vein, to meet an upraise from the 825 level. This will greatly facilitate the handling of ore and prospecting the mine at that point when completed.

**YELLOW JACKET.**—Shipping 175 tons daily to the Brunswick. It is extracted from the 1200, 1300 and 1400 levels. The machinery is all working well.

**ALPHA, IMPERIAL AND EXCHEQUER.**—Progress only is reported from the drifts on the 300. There is no change of interest in the formation.

**BULLION.**—Are cleaning out drifts on the 500 level. The east drift has been cleaned 150 feet and the west drift 20 feet.

**SCORPION.**—On the 300 level the north drift is advanced 128 feet, and the south drift 105 feet. Both are in vein material.

**ANDES.**—The usual progress is reported in the prospecting drifts on the two upper levels of the mine.

**SEGREGATED BELCHER.**—The south drift is in 194 feet, having advanced 23 feet during the week.

**WEST CON. CAL.-VA.**—Are still sinking the shaft. There is no change to report in the work.

#### Eureka District.

**ORE SHIPMENTS.**—Eureka *Sentinel*, March 3: During the past week ore shipments were made from the mines of the district as follows: To the Eureka Co.—Dunderberg mine, 29 tons; Oriental and Belmont, 13 tons; Margueretta, 8 tons; Silver Lick, 17 tons; Massachusetts, 2 tons; Bowman, 7 tons. Richmond Co.—Jackson, 33 tons; Bullwhacker, 5 tons. The outside men at the Eureka Co. slag dump were discharged last Wednesday morning, but will again resume work after the reduction works have been overhauled.

#### Hawthorne District.

**THE PAMILCO.**—Esmeralda *Nevada*, March 3: The Pamlico mine is another of the accidental discoveries of Hawthorne district. In July, 1885, S. A. Knapp, Jr., found a piece of float rock rich in gold, on what is now known as the Pamlico ground, and taking it as a sure index of a valuable mine, made the location. In the fall of that year some prospecting work was done, which resulted in such encouraging indications that the work was continued in a small way during the spring of 1886, when a crushing of ore was made giving a product beyond expectation. Out of the first batch of ore worked \$1500 was produced, which amply paid for the labor and other expenditures. In 1887 the mine was let out to tributers who continued the work of prospecting, developing and extracting ore from the mine. Several of the miners and prospectors have made "handsome stakes" on their leases of this claim. It has become the attraction of the district and many old miners are amazed at its productions. On the easterly line of the claim there was an area of about a quarter of an acre of soil, which varied in depth from one to seven feet, diffused with gold from which many tons were gathered, screened and worked, netting immensely. At present the owners,



Messrs. Knapp, Laws, Forbes, Tobey, Yerington, Jr., and D. L. Bliss, have a small force of men at work on the mine who are extracting the rich ore, 15 tons of which was worked at the Kindred mill. The returns were received last Saturday amounting to \$6344. The mine is being worked in three places—the north tunnel, middle incline and south tunnel; the course of the ledge is north and south, dipping east. On the surface of the claim there are 3 stringers, which in their course downward come together, making a ledge of varied width from one to four feet. From the middle incline, drifts are run southerly in which there is a 12-inch vein of rich ore, and if it continues with its present richness by the end of this month there will be several thousand dollars produced by the labor of a very few men. The north and south end tunnels are run on the easterly stringer from which the other more westerly veins are crosscutted; the developments therein are flattering. Though but few men have been worked on the claim, there is already a systematic method employed in its development. The ledge is proved by exploration to maintain its strength and continuity in depth and extent, and has free gold disseminated through the quartz which can be seen with the unaided eye. There is considerable rich ore now on the dump, while the stopes, crosscuts and levels show up like a jeweler's window.

#### Seligman District.

**THE CONCENTRATOR.**—Eureka Sentinel, March 3: The concentrator building is looming up grandly, being entirely finished on the outside. The balance of the machinery is arriving and is being set up as rapidly as the mechanics and helpers can do the work. The mechanics, miners and laborers at the Seligman mill and mines have been comfortably lodged during the winter in log buildings erected for that purpose. Ninety men are employed by Eugene N. Robinson at Seligman. Work is being diligently prosecuted in the Purcell series of mines, and 30 extra miners will be put on, but none who are not thoroughly experienced will be employed. The ore in the mines is improving in quality in a number of different places, as shown by 30 or 40 samples taken daily from the various openings for trial assays. From 15 to 20 tons of concentrates per day will be turned out from the mill at Seligman when it will be in operation. It is estimated that the value of these concentrates will contain about 70 per cent lead, 65 ounces silver, besides the gold and considerable iron.

#### Tuscarora District.

**NAVAJO QUEEN.**—Times-Review, March 2: Have finished sinking sump and commenced crosscutting for ledge.

**PONDERE.**—Have suspended work in the crosscut and have commenced drifting both north and south on Ledge No. 2. Ledges in drifts are looking favorable.

**BELLE ISLE.**—East crosscut, 250-foot level, has been extended a total distance of 145 feet. A drift has been started north on a vein crosscut a short distance back from the end of the crosscut.

**FOUND TREASURE.**—Stope from No. 1 chute continues to yield usual amount of good ore. Commenced shipping ore to reduction works yesterday. Will ship only enough to pay running expenses till roads improve.

**NAVAJO.**—There is no material change in any of the workings.

**NEYADA QUEEN.**—On the 350-foot level, west crosscut has been advanced 11 feet. Several seams of spar have been encountered. North drift, same level, on the east vein, has been advanced 29 feet. The face of the drift is now looking better than for the past few days, and the flow of water is increasing as we go north.

**NORTH BELLE ISLE.**—North lateral gangway, 400-foot level, has been extended 20 feet. The formation looks favorable. The flow of water is stronger. Line crosscut, 300-foot level, has been extended east 82 feet. The face of the crosscut is now in vein matter assaying between \$25 and \$50. Have started to open the stopes north of No. 3 crosscut on this level. No. 1 upraise on the vein, on the 70-foot level, is developing a good width and grade of ore. Present height 26 feet. West crosscut on this level, to connect with the shaft, has been extended 20 feet. The stopes at all points are yielding the usual grade and quantity of ore.

**GRAND PRIZE.**—Three-hundred-foot level: South crosscut extended 21 feet; total length, 750 feet, and shows no change. Face of west drift advanced 19 feet in low-grade ore; total length, 189 feet. The west crosscut on the 200-foot level extended 27 feet through a porphyry formation, and will be pushed ahead as rapidly as possible to develop the ore body now exposed above the 300-foot level. The extraction of ore was discontinued last Monday owing to there being only a sufficient amount of fuel left to work what ore was broken and in the mill. The stopes were left showing more good ore than at any time previously. The mill will be shut down and cleaned up next week, after which all necessary repairs will be made preparatory to starting up again as soon as fuel can be had.

**COMMONWEALTH.**—On the 100-foot level the west drift has been extended 21 feet, showing good ore. The ore has raised above the top of the drift, and work will be suspended at this point for the present. On the 150-foot level north drift from the station has been extended 12 feet. Upraise from north drift has been extended nine feet. The ore cut in the top of this raise is three feet wide, and same as in the north drift on the 100-foot level; assays show from \$266 to \$800 per ton.

#### ARIZONA.

**COPPER QUEEN.**—Tombstone Epitaph, March 3: The Copper Queen Co. uses 1,000,000 feet of lumber per month in the mine, extracts and smelts 240 tons of ore a day; has 311 men on the pay-roll; distributes \$300,000 per month in wages, and uses 450 cords of wood every 30 days.

**WALLAPAI DISTRICT.**—Cor. Mohave Miner, March 2: Among some of the mines now being worked in this district, we are informed by our correspondent, who has recently taken a trip over the hills, that the prospect in the near future is very bright. Among the many he particularly mentions the Old Keystone mine at Mineral Park, the 63, now known as the 78 mine, the Flores, Vanderbilt, Twins, Champion, Rural, Stark & Ewing, Rural

Extension, known as the Josephine, and several others which have been lying idle for some time.

**THE KEYSTONE MINE** is now producing some of the richest ore ever taken from the mine, at the 150 and 200 foot levels. This claim, if energetically worked, would keep the 10-stamp mill running constantly on \$50 ore. It is, however, leased, and the lessees are only handling high-grade ore—\$150 to \$300 ore.

**THE 78 MINE** is situated near Stockton Hill and was formerly known as the 63 mining claim. Formerly it was one of the best known mines in the county and was a famous ore-producer. Last winter, in November, the property was sold to a San Francisco party, who is now exploiting the mine in first-class style. A shaft has been sunk on the claim below the old workings, which were caved and rendered useless. Mr. T. Edgar is running a drift, which is now in over 60 feet from the main working shaft. The footwall of the ledge has been encountered within the week, and as this drift will be over 100 feet deeper than any of the old shafts, and the main ore chute is distant only 90 feet from the main shaft, ore is expected to be encountered at any moment, when a large force of men will be engaged.

**THE FLORES** property, which has lately been in trouble from an overdose of bosses and superintendents, is about being started up under the management of Mr. Jno. Campbell, a practical mining engineer. The mill, we learn, will be under the management of L. Lassell, Esq. Messrs. Campbell & Lassell are taking down the stamps of the Welton mill at the Park, and will put them up in connection with the Flores machinery, together with the Flue concentrators, when all will be hammering away soon on \$20 gold ore.

**THE VANDERBILT MINE** is now leased by James Twigg and Mr. Campbell, and we are glad to say that the ore now being taken from the Vanderbilt is the finest lot ever yet extracted from the mine. The ore taken out of the Vanderbilt will average \$150 per ton in free gold, and not by any means a "pocket." We have lots of mines here that will turn out \$100 per ton in gold. The Flores, the Eureka, the Vanderbilt, the Oro Plata and the Alpine will do it.

#### COLORADO.

**REDWELL BASIN.**—Elk Mountain Pilot, March 2: Dr. Evans and Charley Huesner have gone up into Redwell Basin to work on a new location made by them recently. It is an old abandoned location that has a 200 or 300 foot tunnel, situated near McGee's old cabin, and the doctor thinks he has very good prospects to get pay mineral in sufficient quantity with a very little work.

**SYLVANITE.**—We learn that W. S. Baker has sent in from Denver \$2000 to pay off the men at the Sylvanite mine.

**CONTRACT.**—We understand Tom Burke has taken a contract on the Pacific mine on Treasury mountain, and will drive the tunnel 50 feet for \$12.50 per foot. The Hanlon Bros. will probably commence work on their Yule creek property the latter part of this month.

**ASPEN.**—Cor. Georgetown Courier, March 1: The great camp of Aspen is attracting a world-wide attention at present. The city is located in one of the most beautiful valleys in the State, and, though like all typical mountain towns the houses are mostly frame, it is one of the neatest and best-looking mountain towns your correspondent has ever seen. But the mines! Here lies the great hidden secret of Aspen's prosperity. Unlike our veins in Clear creek, there seem to be whole mountains of rich mineral here, and, though but few of the great ore bodies are at present actively worked, the output is almost 2000 tons per week. The two railroads are kept busy and another one or two will be in demand when the wonderful belt of rich mineral is opened that is known to exist between here and Ashcroft, nine miles distant. I have met several of the Georgetown and Silver Plume gentlemen who are here, and all seem to be employed; but it is a fact that the number of laborers here at present far exceeds the demand, though at a not distant future I believe there will be work for all who come. The scarcity of work is owing to the fact that many of the properties will not be actively worked until the settlement of litigation. The coming of spring will also see the opening of many new properties, thus giving employment to hundreds of miners.

#### DAKOTA.

**TIN IN THE BLACK HILLS.**—Deadwood Review, March 2: In response to further inquiries Mr. H. W. Fowler, general manager of the Tin Mountain Co., states that the superintendent of the mines at Tin Mountain, in the Black Hills, reports good progress considering the trouble experienced from the freezing of the water and its consequent scarcity. Still, notwithstanding all the drawbacks attending the working of new machinery, they have about 10,000 pounds of concentrates, and hope in the course of a month or six weeks to be able to ship several carloads to the smelting works. Mr. Fowler says they have plenty of high-grade ore at the mill to work on as soon as the weather justifies the superintendent in pushing matters. We would remark incidentally that this is the sole and only tin mine developed and in operation in Dakota. By development and operation we mean the ore actually mined, delivered at the mill and there made into concentrates ready for the smelting furnace. The company of which Mr. Fowler is the head is composed of leading capitalists of Chicago. The stock is not on the market for sale, and the business of development will be pushed on as rapidly as possible.

**TUNNEL.**—Deadwood Pioneer, March 2: The Rochester Co. has started a tunnel near the Old Savage tunnel site, which they intend to tap the shaft now being sunk on their property in Lead. The tunnel will tap the shaft at the depth of about 400 feet. Messrs. Stein, Reid, Wilder, Hoagland and Brittle, the principal stockholders, will back them up, and they intend to have at least 50 men on the pay-roll within a month.

**BUYING CLAIMS.**—Negotiations of the Deadwood Reduction Works for the services of Mr. Clark, to personally superintend erection of works for treatment of Bald mountain ores, and to devote his entire time to management of the company's business, have been altogether successful. Anticipating this conclusion, a few local men of means have recently been quietly acquiring title to a considerable num-

ber of promising claims situated in the district. The methods pursued have been free from ostentation, and therefore the transfers have called for little or no comment. The prospector or claim-owner has received and accepted an offer, and pocketing the purchase price, returned to his lonely cabin without troubling himself to inform the public he had sold out. The purchaser has kept his own counsel, and as no other parties may have been cognizant of the deal, nothing was known of it. A glance at the receiving-book in the register of deeds office will show, however, that transactions of this nature have been many during the last three weeks. The individuals whose names appear as grantees are able to proceed to thorough development of the claims.

#### IDAHO.

**SILVER DISTRICT.**—Idaho World, March 1: Chas. Curtis and Mike Gould arrived here Friday evening from Silver district. Mr. Gould, who is employed in the Julia mine, says they cut through the ledge, which proved to be nine feet wide, and all good ore. He estimates that taking the entire ledge, the ore will mill \$30 per ton, and by assorting will mill \$50. This is good for a ledge of that size. In portions of the vein the silver lies in flakes, and is easily detached from the ore with a knife blade.

**BONANZA HIGHTS MINE.**—Ketchum Keystone, March 2: Another important mining locality, and one which will prove advantageous to Ketchum, is now creating considerable attention, from the fact of a fine rich strike having recently been made in a mine known as the Bonanza Hights. This property is situated on the range of mountains forming the boundary line between Alturas and Custer counties, about four miles north of the Summit house, on the Ketchum and Challis toll-road, and about 2½ miles from the road, and 18 miles north of Ketchum. The owners have been running a tunnel for the last three months to tap the vein, and in running a distance of 100 feet they were successful in cutting the ledge, which was found to be from six to seven feet wide—2½ feet of the vein being good pay ore, and a foot of solid galena assaying from 70 to 200 ounces of silver, half an ounce in gold and from 50 to 70 per cent lead per ton. This is an exceedingly fine showing.

**MINING NOTES.**—The Keystone is credibly informed that the Vienna Co. will expend \$60,000 the present season in driving a tunnel that will explore the ground of their mines at Vienna from 600 to 800 feet deeper than their present workings. The same company have purchased the Vishnu property at Rocky Bar.

**ACROSS THE BASIN.**—Idaho World, March 1: Auditor and Recorder Tim Carroll returned Saturday from a week's visit across the basin. Tim informs us that the shaft being sunk to open the second level of the Pioneer mine at Quartzburg is down 70 feet below the upper level, the shaft for this level having been sunk 100 feet. The shaft will be extended down 150 feet for the second level. The mill will start up in about two weeks. There are now 400 tons of ore in the mine and 200 tons in the mill. The Pioneer is the property of the Gold Hill Co. Dave Coughanour of this company has put men to work in the Yellow Jacket mine at Quartzburg. The Yellow Jacket is owned by Mr. Coughanour individually. John Ellis & Co. have been prospecting all winter for a ledge in Sailor gulch near Placerville.

#### MONTANA.

**REPORTED IN BONANZA.**—Inter-Mountain, March 2: It is currently reported and generally believed in the Phillipsburg country that the San Francisco tunnel is in Bonanza, with a big showing. No figures relative to the strike are known, as the company's affairs are kept from the public knowledge as much as possible, but this has leaked out. It has been understood all along that the tunnel or adit, which is now in on the vein for a distance of about 1500 feet, crossed the tops of several ore chutes in its course, and the report that another has been cut is readily credited. This strike, however, is believed to be richer than any yet made.

**THE COMBINATION COMPANY'S MILL.**—At the meeting of Combination company trustees last night it was decided by resolution to start the mill up as soon as a sufficient quantity of ore is on the dump to insure a continuous run—say about 1000 tons. They expect to have that much ore out by the early part of April.

**THE HOPE COMPANY'S STRIKE.**—The Hope company has just made a valuable strike in their Silver Chief mine, which is in the granite some distance southeast of the limestone hill out of which they have taken such quantities of wealth in the past. The Silver Chief ore body is about 14 inches wide and runs about 150 ounces.

**NEW GRANITE WORKS.**—The New Granite mill has not yet been located. The company desires, if possible, to so locate it that a tramway may be built directly from the mine to the mill. The smelter project is still talked of also, and its location will necessarily be determined largely by the question of convenience to fluxes.

**THE BI-METALLIC.**—The Bi-Metallic is shipping about \$50,000 worth per month of 300-ounce ore, and taking out a considerable quantity of ore of lower grade.

**WILL DOUBLE THE CAPACITY.**—Inter-Mountain, Feb. 24: Work is being pushed energetically on the Anaconda Company's new smelter at the Valley City, about 700 men being employed upon it. The foundations are now in (a big work in itself), and the excavating for flue-ways to the big chimney is well along. Instead of having a separate stack for each furnace, as is customary, one big stack is in the new smelter to answer for all. Its height is 125 feet and the flue-way is 16 feet square. There will be 32 furnaces in the new smelter, which will more than double the capacity of the works. The works at present treat 1400 tons of ore per day, and the new smelter will increase the capacity to about 3000 tons per day. The work will be completed about the middle of the summer. Anaconda expects a big boom to result from starting up the new works.

**FIRST HUNDRED TONS WORKED.**—The Poor-man is producing daily 10 tons of better grade than any heretofore produced from the mine. A contract has been let for 200,000 feet of lumber to build a new concentrator. Supt. Clark will be in Butte in a few

days. The following dispatch from Mr. Clark to Secretary Warren explains itself: "Telegram from Holden says, first 100 tons worked, and assays 62 ounces silver, 61 per cent lead. Would net on yesterday's quotations \$73 75 per ton."

#### NEW MEXICO.

**STARTED UP.**—Silver City Enterprise, March 2: The Wynnan at Stein's pass has started up with a full force. The Beck and Bachelor are shipping to El Paso. Dr. F. M. Endlich, the former manager of the Lake Valley mines, is the superintendent of the smelters at San Pedro, Santa Fe county. Mr. Griffith, engaged in mining at Shakespear, says that if there had been proper management at the camp 1000 men might be at work there. Five bars of silver bullion were shipped from Georgetown recently by Geo. O. Smith, and some by Payne, Washington & Co., who did some custom milling before shutting down for lack of water. Col. W. S. Morrow has arrived from Washington and purchased Jack Fleming's D. S. C. B. ten-stamp mill, and will move it to Shakespear for the Hercules Co., which will soon be operating. There are now ten bars of silver bullion in the Silver City National Bank, the property of Sheridan & Fleming, as the product of a two weeks' run on Uncle Sam ore by the Bremen mill. The bars are worth about \$1200 each, on an average. Several other bars will be cast before the shipment is made. J. L. Mason of Kingston has placed in Kansas City, three mines in the hands of local capitalists, at a total capitalization of \$1,200,000. He says that hundreds of moneyed men are seeking for information at the Exchange now, and is sure Kansas City is destined to distance St. Louis as disburbing point for the mines of the west.

**COONEY CAMP.**—Cor. Silver City Enterprise: M. Cooney was interviewed to-day. He says: "The Coats contract on the west side of the mill is being pushed rapidly. The contract price is \$4.75 per foot. The contractors have found soft gouge, and the whole face of the tunnel is in ore carrying sulphides of silver and pure gold in sufficient quantities to satisfy all parties concerned. Vingo's contract on the north side is a fac-simile. The contractors are averaging from 2 to 2½ feet per day. It is, according to the old-timers, as good as the best prospect ever discovered in the Mogollons. A railway tram will carry ore from Coats level to the grizzly and from the Vingo tram the same. The broken weather has prevented the mill being completed, as the teams could not get over the mountains with the necessities for completion." The captain is sanguine that, fair weather permitting, his mill will be running inside of 30 days. It is the intention to add five stamps more as soon as possible.

#### UTAH.

**GOLDEN TREASURE.**—Salt Lake Tribune, March 2: The Golden Treasure mine, near Silver City, Tintic district was a large producer of ore a few years ago, and has lain idle some three or four years. The old shaft is down 300 feet, from which several levels have been run. Since shutting down work on this old part of the mine, the cuttings have so caved in as to prevent going in. A few months ago work began at a shaft 633 feet away and at a point 178 feet lower than at the surface of the old shaft. The new shaft is down 160 feet, from which drifting has been done—but not in a straight line—a little over 500 feet, leaving about 180 feet to connect with the old works on the 300-foot level. In driving this drift, they run 350 feet before getting ore, and lately have commenced stoping from a chute 65 or 70 feet broad and from 18 to 24 inches wide. From these stopes ore is being shipped that runs about 40 ounces silver, \$3 to \$4 in gold, 35 per cent iron and 15 to 17 per cent silica. It is 180 feet from the drift up to the surface, and this is believed to be good stoping ground all the way up. With this chute, and the chute in the old workings, it is believed that the property will soon become a great ore-producer. The drift cut clear through that ore chute and only a few days ago struck another ore chute which shows at the head of the drift 16 inches of ore that assays 27 to 30 ounces silver and 35 per cent iron, and when our informant saw it, the ore was improving in appearance. The property belongs to a company, of which Thomas Marshall is president and J. E. Dooly treasurer. The Tesoria lies at the west, and the Julia Lane at the south, both being good properties.

**ORE AND BULLION SHIPMENTS.**—Park Record, March 3: The Mackintosh sampler has received no ore the past two weeks on account of bad roads from the mines. During the week the Crescent shipped 165,000 pounds of first-class ore. On the 1st inst. (Thursday) the Ontario shipped 38 bars of bullion containing 22,785 fine ounces of silver. The product of Duly bullion from the Marsac mill the first of the week was six bars, 7729 fine ounces, and on Thursday another six bars, 7117 fine ounces of silver, were turned out.

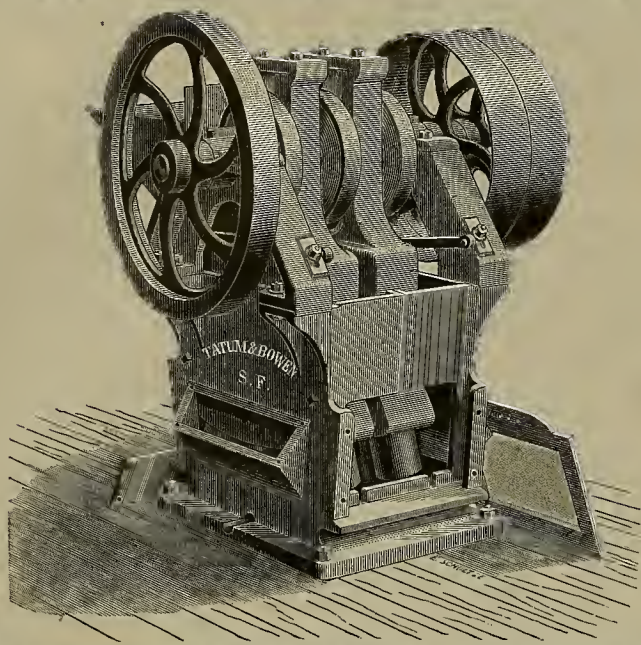
**DEER VALLEY.**—Reports from the Deer Valley Consolidated are very encouraging, and some good-looking stuff has lately been brought in. Mr. Schenck will have his contract (that of driving the tunnel a distance of 300 feet) finished in about six weeks, by which time it is hoped an agreeable surprise will be uncovered. The completion of this contract will make the tunnel nearly 500 feet long, and the persistent owners certainly deserve success.

#### WASHINGTON TERRITORY.

**DISCOVERIES.**—Cor. Portland Oregonian, March 3: Several persons who have recently come in from the Okanagan mining region give flattering accounts of prospective developments and new discoveries, not only in the Simlun river camps, but far to the north, near the British line. The early disappearance of snow in that section has enabled miners and prospectors who wintered there to resume work much earlier than was expected, and several promising discoveries have plunged the entire district into a briskness bordering upon what might be termed almost a genuine excitement. The new discoveries are near Wanicut lake, 12 miles south of the British line and 20 miles west of the Okanagan river. Judging from present indications, the Okanagan country will be visited this season by many thousand miners and others, and if the present flattering prospects hold good, one of the richest mineral-producing districts in the West will be added to the wealth of Washington and Oregon.



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DOUBLE "ECONOMIC" STAMP MILL.



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The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

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Goes with each Mill. We also have a snitable

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Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

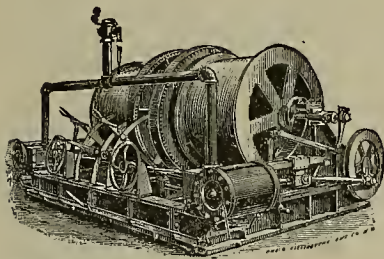
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1, 2, or 4 Drums, with Reversible Link Motion or Pat. Improved Friction.

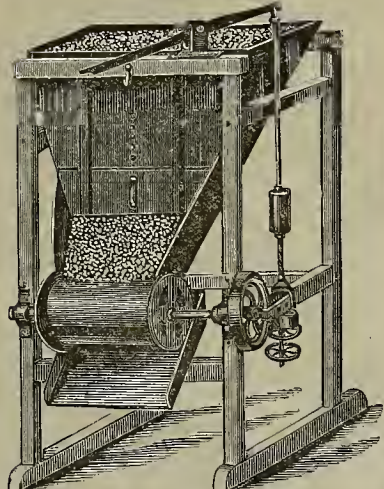
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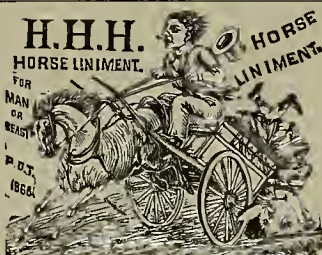
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This is the best and cheapest Ore Feeder now in use. It has fewer parts, requires less power, is simpler in adjustment than any other. Feeds coarse ore or soft clay alike uniformly, under one or all the stamps in a battery as required.

In the Bunker Hill Mill it has run continuously for two years, never having been out of order or costing a dollar for repairs.

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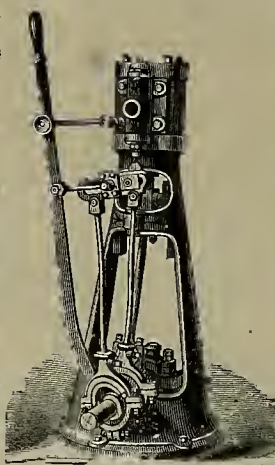
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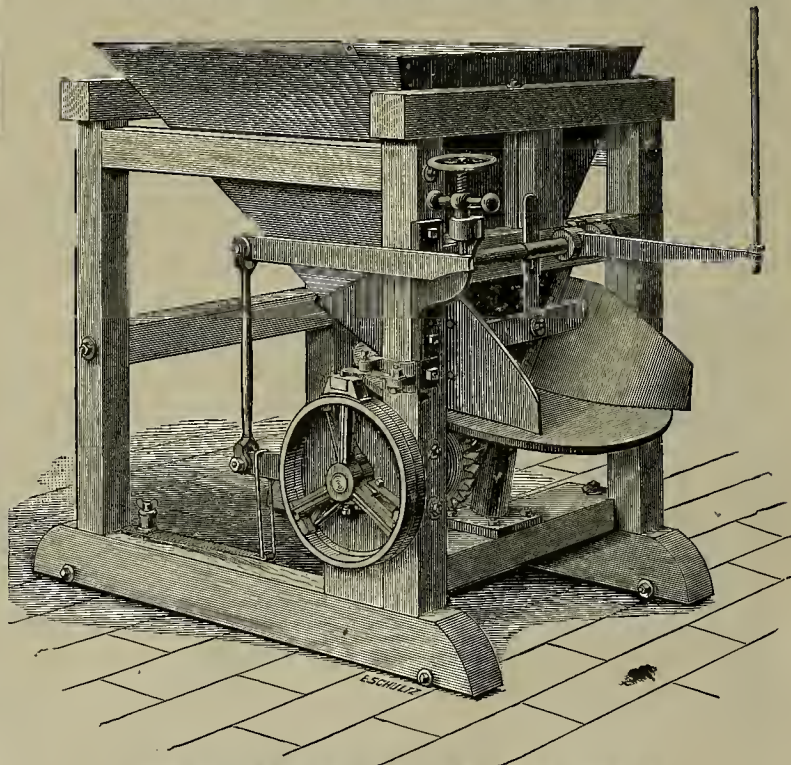
## ENGINES and BOILERS

FROM 2 TO 100 H. P., ALWAYS IN STOCK

MILL SUPPLIES AND LUBRICATING OILS.

## JOSHUA HENDY MACHINE WORKS,

Nos. 39 to 51 FREMONT STREET, SAN FRANCISCO, CAL.



"HENDY" IMPROVED "CHALLENGE" ORE FEEDER.

The best form of Feeder ever devised, and pronounced by reputable mining men to be far superior to any form of "Roller" Feeder manufactured. We refer to the following gentlemen who have furnished us with testimonial letters to the above effect, which can be seen at our office, viz:

N. W. CROCKER, Supt. Bunker Hill Gold Mining Co., Amador City, Cal. | D. C. WICKHAM, Taylor Mine, Greenwood, Cal.  
J. R. TREGLOAN, Supt. South Spring Hill Gold Mining Co., Amador City, Cal.  
W. G. ROBERTS, Greenwood, El Dorado Co., Cal.

WE ARE MANUFACTURERS OF THE

"CHALLENGE," "STANFORD," "TULLOCK," & "ROLLER" FEEDERS,  
And will furnish descriptive Catalogues and quote prices upon application.







## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING FEBRUARY 28, 1888.

- 378,762.—LOCOMOTIVE SMOKESTACK—P. J. Brown, Winslow, A. T.  
378,825.—PAINT—H. Burnett, East Portland, Oregon.  
378,576.—CORSET-STEEL PROTECTOR—Ellen Cushing, S. F.  
378,581.—HARVESTER—M. P. Farnham, Germantown, Cal.  
378,833.—FIRE ESCAPE—Gavin, Cromer & Cromer, Eureka, Nev.  
378,834.—WRENCH—Gavin, Cromer & Cromer, Eureka, Nev.  
378,589.—ADVERTISING CLOCK—G. Hoisholt, Watsonville, Cal.  
378,590.—HYDROCARBON BURNER—H. L. Howse, S. F.  
378,450.—ORE CRUSHER—S. Kendall, S. F.  
378,455.—CRIB BEDSTEAD—Carrie Morse, S. F.  
378,520.—MANUFACTURE OF PAPER—Pearce & Beardsley, Oakland, Cal.  
378,556.—MAGAZINE GUN—E. E. Redfield, Linkville, Ogo.  
378,721.—MEANS FOR PREVENTING THE CREEPING OF RAILS AND RAIL JOINTS—J. J. Reilly, Spokane Falls, W. T.  
378,528.—CORRECTING DEVICE FOR SHIPS' COMPASSES—L. Siricix, S. F.  
378,809.—RAILWAY SWITCH—W. H. Stowell, Eureka, Cal.  
378,819.—STOCKING—Frank Wilcomb, S. F.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**COMBINED HARVESTER AND THRASHER.**—Moses P. Farnham, Germantown, Colusa Co. No. 378,581. Dated Feb. 23, 1888. This apparatus for thrashing grain is designed specially to be used on hilly and uneven land. The machine may be drawn independently or without the header when desired to any point where it is to remain stationary while thrashing, and driven by means of a belt from an engine, but it may, however, be used in connection with a header or cutting apparatus. A number of details of construction and combinations of devices are covered by this patent.

**CORSET STEEL PROTECTOR.**—Ellen Cushing, S. F. No. 378,576. Dated Feb. 23, 1888. This is one of that class of protectors for corset-steels in which an auxiliary piece of steel is employed to stiffen a previously broken steel or strengthen a perfect one. The improved protector is made of a single independent strip of metal bent longitudinally, and fitted over or embracing the steel of the corset, this piece or strip having its folds of unequal lengths, and projecting beyond the steel, whereby it may be fastened to the corset. The independent strip is provided with slots or eyes for the passage and exposure of the hooks and eyes of the corset-steel.

**HYDROCARBON BURNER.**—Henry L. Howse, S. F. No. 378,590. Dated Feb. 23, 1888. This apparatus is designed for the combustion of hydrocarbons and especially gasoline, benzine, naphtha, or the lighter products of petroleum or gas. It consists of water-chambers connected together, a means for keeping up a supply and maintaining a level therein, and a double-chamber burner having small connecting pipes or passages between the upper and lower portions, together with a safety screen and certain details of construction. The device is intended especially to be fitted to stoves or ranges, and as it extends across the full length of the fireplace it will be seen that by means of the partition a fire may be confined to one side of the stove when but little is needed, or by using both compartments this fire may be made in the whole of the stove.

**ADVERTISING CLOCK.**—Gustav Hoisholt, Watsonville, No. 378,589. Dated Feb. 23, 1888. The invention relates to that class of advertising devices in which printed matter, cards, etc., are temporarily exposed to view and again withdrawn, and especially to those devices of this class in which the operating mechanism is dependent upon and is combined with audible clockwork, the whole being consequently known as "advertising clocks." The invention consists essentially in the combination of independent pivoted levers, which are each attached to the card or other matter to be advertised, and a rotary cylinder provided with a cam, preferably a cam groove, or slot, and against which said cylinder the ends of the levers impinge, whereby they are held in and returned to one position, when the solid periphery of the cylinder is traveling against them and allowed to fall to another position by their ends dropping into the section of the cam groove of the cylinder successively. In this way, as each lever drops, the card to which it is attached is exhibited at the aperture or window in the clock casing, and is not withdrawn

until another lever drops to exhibit its card, and so on continuously.

**GATE.**—Robt. B. Lyon, Sonoma, assignor of one-half to Thos. S. Glaister. No. 378,056. Dated Feb. 14, 1888. This is one of that class of self-operating gates in which the gate is mounted on a double inclined plane, up one side of which it is caused to travel by the primary force applied, descending the other side and completing its movement by gravity. The double inclined track, in connection with the guide track and the gate mounted between them, enables the inventor to put both tracks out of the roadway and yet perfectly support the gate as it spans the road. This patent covers "a gate and a double inclined track on which it travels, in combination with operating cords and the means for attaching the cords to the gate, consisting of a pivoted lever to which the cords are attached, said lever being in the top center of the gate, and having its lower end forked, a sliding bar mounted on the gate, and having a pin playing between the arms of this lever, and a chain or cord connecting the bar with the gate-post, of such a length as to move the bar longitudinally at the end of each movement of the gate, whereby this pivoted lever is thrown from one side of the gate to the other and locked."

## Mining Share Market.

There has been some little fluctuation in the mining share market during the week, the Gold Hill stocks having advanced more or less.

The following mining companies have cash on hand according to the statements placed on file:

Alpha, \$24,973.48; Andea, \$3498.64; Alta, \$27,641.86; Belle Isle, \$2787.59; Belcher, \$5358.92; Bullion, \$25,563.57; Bodie, \$26,586.05; Best and Belcher, \$5493.84; Bulwer, \$4417.03; Crown Point, \$6183.85; Consolidated Imperial, \$9338.58; Challenge, \$13,692.10; California, \$2114.57; Confidence, \$694.99; Con. California and Virginia, \$192,085.25, besides \$160,000 in bullion at the mill and further shipments to arrive before the end of the fiscal month; Chollar, \$2891.11; Crocker, \$625.57; Commonwealth, \$3632.59; Dudley, \$616.16; Eureka, \$46,000; Eschschner, \$2404.81; Foundry, \$756.94; Gould and Curry, \$2222.97; Hale and Norcross, \$230.12; Independence, \$442.65; Julia, \$1096.23; Justice, \$9235.26; Lady Washington, \$8483.55; Mono, \$25,486.33; Mexican, \$20,822.08; North Belle Isle, \$51,410.81, besides \$88,000 in bullion at the mill; Ophir, \$10,869.94; Overman, \$36,032.85; Occidental, \$7633.06; Orleans, \$531.59; Ponder, \$19.10; Peer, \$1785.30; Peerless, \$10,534; Syndicate, \$10,317.89; Sierra Nevada, \$8162.49; Standard, \$74,136.71; Utah, \$13,701.46; Union, \$35,390.03; Weldon, \$5487.39.

The following have an indebtedness: Grand Prize, \$33,048.49, but has an offset of bullion in the local office amounting to \$23,836.48, also a \$15,000 shipment which is now in transit; Holmes, \$12,119.04; Keyes, \$12,269; Mt. Cory, \$47,977.15; Nevada Queen, \$11,876.07; Navajo, \$5771.56; Potosi, \$20,734.20; Seg, Belcher, \$15,668.75; Savage, \$38,103.36, but has unsold bullion on hand amounting to \$9500, with further shipments to arrive.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Grand Prize, March 3, \$15,000; North Belle Isle, 3, \$88,000; Con. California and Virginia, 6, \$170,000; Hanauer, Feb. 29, \$5665; Germania, 29, \$3497; Hanauer, March 2, \$4890; Germania, 2, \$1650; Queen of the Hills, 2, \$1010; Germania, 3, \$1631; Hanauer, 3, \$2225; Silver Reef for Feb., \$27,245; Eureka Con., 5, \$15,000; Mt. Diablo, 5, \$15,770.

## Our Agents,

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

F. E. LOAN—Santa Clara Co.  
JOHN C. H. LAMPADISI—Monterey and S. L. Obispo Co.'s  
G. W. INOALS—Arizona Territory  
WM. WILKINSON—Stanislaus and Merced Co.'s  
A. F. JEWETT—Tulare Co.  
C. E. WILLIAMS—Yuba and Sutter Co.'s  
R. G. HUSTON—Montana Territory  
G. H. SCHAEFFLE—Calaveras Co.

**THE Dr. Bredsmeyer**, who has been trying to starve himself in the jail at Salt Lake, is a mining engineer who formerly resided in California, but who has been in Utah some years. He lived for many years in Siam and in China, and has always been connected with mining matters.

The report of the United States Sub-Treasurer for February shows the following amounts of money in the vaults at San Francisco: Gold coin, \$28,698,401; currency, \$556,115; standard silver dollars, \$18,373,501; fractional silver \$6,969,185; minor coin, \$8597. Total, \$54,635,799.

The best way to "boom" a mine is with pick, shovel, drill and powder. There are apt to be results from that kind of booming. The best way to furnish "wind" for mining operations is from an air-compressor.

**BARNEY COYLE**, a miner, was caved on in the Ophir mine on Monday last, and badly hurt.

**PIC IRON** has gone up about 50 cents per ton on all grades in the local market.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

COMPANY.		LOCATION.		AMT. LEVIED.		DELINQ. NT. SALE.		SECRETARY.		PLACE OF BUSINESS.	
Andes M. Co.	Nebraska	5.	05.	Feb. 23.	Apr. 4.	Apr. 27.	J. M. Quay.	406	Montgomery St.	320	Montgomery St.
Alaska M. Co.	California	7.	10.	Feb. 21.	Mar. 26.	Apr. 16.	A. Judson.	316	Adelphi St.	320	Montgomery St.
Bodie Con. M. Co.	California	8.	50.	Feb. 13.	Mar. 20.	Apr. 26.	G. W. Sessions.	308	Montgomery St.	321	California St.
Comet Con. M. Co.	California	4.	30.	Jan. 6.	Feb. 17.	Mar. 14.	H. Lacy.	321	California St.	522	Montgomery St.
Champion M. Co.	California	23.	10.	Feb. 14.	Mar. 19.	Apr. 16.	T. Wetzel.	309	Montgomery St.	309	Montgomery St.
Claxton M. Co.	California	1.	25.	Feb. 15.	Mar. 27.	May 1.	A. Waterman.	309	Montgomery St.	309	Montgomery St.
Calaveras Blue M. Co.	California	1.	05.	Feb. 22.	Mar. 19.	Apr. 9.	B. Burris.	309	Montgomery St.	309	Montgomery St.
Day M. Co.	Nebraska	15.	10.	Feb. 8.	Apr. 9.	Nov. 7.	R. R. Grayson.	307	Pine St.	339	California St.
Eschschner M. Co.	Nebraska	25.	20.	Feb. 7.	Mar. 17.	Apr. 17.	C. E. Elliott.	339	California St.	1018	Market St.
Equitable Tunnel Co.	Utah	33.	15.	Feb. 14.	Mar. 30.	May 9.	C. J. Collins.	309	Montgomery St.	113	Ledado St.
Every M. Co.	Nebraska	5.	20.	Jan. 13.	Feb. 17.	Mar. 9.	L. P. Holden.	308	Montgomery St.	419	California St.
Foundry M. Co.	Nebraska	2.	06.	Jan. 31.	Mar. 20.	Apr. 23.	J. Stadfeld Jr.	309	Montgomery St.	522	Montgomery St.
Cray Eagle M. Co.	California	6.	14.	Mar. 6.	Apr. 10.	Apr. 3.	T. Wezel.	310	Phelan Building	323	Montgomery St.
Golden fleece G. M. Co.	California	12.	7.00.	Jan. 28.	Mar. 15.	Apr. 10.	W. J. Geason.	323	Montgomery St.	323	Montgomery St.
Heath M. Co.	Idaho	3.	05.	Feb. 14.	Mar. 19.	Apr. 16.	W. L. Oliver.	323	Montgomery St.	323	Montgomery St.
Keyes S. M. Co.	Nebraska	1.	20.	Feb. 15.	Mar. 20.	Apr. 16.	H. Deas.	323	Montgomery St.	323	Montgomery St.
Kennedy M. Co.	California	3.	10.	Feb. 20.	Apr. 2.	Apr. 23.	L. F. Reichling.	323	Montgomery St.	323	Montgomery St.
Live Oak Drift G. M. Co.	California	8.	10.	Feb. 13.	Mar. 20.	Apr. 14.	T. Wetzel.	323	Montgomery St.	323	Montgomery St.
Livermore Oil Co.	California	2.	05.	Mar. 6.	Apr. 9.	Apr. 18.	H. Deas.	323	Montgomery St.	323	Montgomery St.
Mayflower G. M. Co.	California	40.	50.	Jan. 17.	Feb. 23.	Mar. 16.	J. Morizo.	323	Montgomery St.	323	Montgomery St.
Mayfield G. & S. M. Co.	California	35.	70.	Jan. 17.	Feb. 23.	Mar. 16.	J. Morizo.	323	Montgomery St.	323	Montgomery St.
North Bonanza M. Co.	Nebraska	8.	15.	Jan. 10.	Feb. 15.	Mar. 14.	J. J. Scoville.	323	Montgomery St.	323	Montgomery St.
Paradise Valley M. Co.	Nebraska	4.	10.	Jan. 28.	Mar. 1.	Mar. 23.	W. L. Oliver.	323	Montgomery St.	323	Montgomery St.
Pittsburg M. Co.	California	20.	75.	Feb. 14.	Mar. 17.	Apr. 6.	C. J. Baumann.	323	Montgomery St.	323	Montgomery St.
Quartz Mt. C. M. Co.	California	20.	70.	Jan. 17.	Feb. 23.	Mar. 16.	J. Morizo.	323	Montgomery St.	323	Montgomery St.
Spring Valley G. M. Co.	California	20.	50.	Jan. 11.	Mar. 17.	Apr. 16.	H. P. Poir.	323	Montgomery St.	323	Montgomery St.
S. F. Copper Co.	Nebraska	2.	41.	Feb. 3.	Mar. 10.	Apr. 3.	H. Pichoir.	323	Montgomery St.	323	Montgomery St.
Virginia Creek Hyd. M. Co.	California	5.	05.	Feb. 23.	Apr. 4.	May 1.	J. M. Quay.	466	Montgomery St.	466	Montgomery St.

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING.	DATE.
Chollar M. Co.	Nebraska	C. E. Elliott.	309 Montgomery St.	Annual.	Mar. 21
Evening Star M. Co.	California	J. J. Scoville.	309 Montgomery St.	Annual.	Mar. 21
Gover M. & M. Co.	California	J. T. Ashby.	402 Front St.	Annual.	Mar. 14
Hale & Norcross M. Co.	Nebraska	J. F. Lightner.	306 Montgomery St.	Annual.	Mar. 14
Nye M. Co.	California	W. J. Deane.	405 California St.	Annual.	Mar. 14
Potosi M. Co.	Nebraska	C. E. Elliott.	309 Montgomery St.	Annual.	Mar. 14

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE.
Con. California & Va. M. Co.	Nebraska	A. W. Havens.	309 Montgomery St.	50.	Mar. 10
Eureka Con. M. Co.	Nebraska	H. R. P. Hutton.	306 Pine St.	25.	Mar. 6
North Belle Isle M. Co.	Nebraska	J. W. Pew.	310 Pine St.	50.	Mar. 2
Oregon Coal & Navigation Co.	Oregon	R. B. Williams.	211 Sansome St.	1.50.	Mar. 2
Pacific Iron, Salt & Soda Co.	California	A. H. Deane.	309 Montgomery St.	1.00.	Mar. 2
Russell Reduction & M. Co.	California	J. Morizo.	323 Montgomery St.	45.	Sept. 17
San Francisco Copper M. Co.	California	F. E. Berier.	320 Sansome St.	05.	Sept. 19
Standard Con. M. Co.	California	J. W. Pew.	310 Pine St.	05.	Jan. 12

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

**INDIAN CREEK LAND AND M. Co.**, March 1. Capital stock, \$500,000. Directors—F. E. Berge, S. C. Mills, Geo. M. Condes, A. Barker and G. W. Carman.

**CALIFORNIA AND MEXICAN IMPROVEMENT CO.**, March 2. Object, to manage in this United States and Mexico the business of contracting for the improvement of harbors, lakes and rivers; constructing canals, locks and ditches; driving tunnels and building rail and other roads, bridges, telegraph and telephones lines; reclaiming lands, constructing drainage and sewerage works and dams, besides the acquiring, holding and disposing of land. Capital stock, \$10,000,000. Directors—William H. H. Hart, B. F. Tuttle, James A. Johnson, J. V. Ellis, J. K. Luttrell, P. D. Wigginton and John P. Irish.

**PACIFIC BAKING CO.**, March 5. Object, to build cracker bakeries in California. Capital stock, \$50,000. Directors—H. W. Brown, J. A. Campbell, Frank Kohi, J. P. O'Brien and Carter Tevis.

**WEST YELLOW JACKET M. Co.**, March 5. Location, Nevada. Capital stock, \$10,000,000. Directors—W. E. Waters, Thos. Watson, B. F. Dahl, C. H. Mason, and H. P. Cohen.

**CONSOLIDATED EUREKA M. Co.**, March 3. Capital stock, \$10,000,000. Directors—Chas. T. Bridges, W. E. Sell, A. W. Ross, Jr., N. D. Anderson and Chas. S. Wheeler.

## San Francisco Metal Market.

WHOLESALE.		THURSDAY, Mar. 8, 1888.	
ANTIMONY—French Star.	91 @	—	—
Copper—	26 @	30	—
Bolt.	26 @	—	—
Sheathing.	26 @	—	—
Ingot.	16 @	18	—
Iron Box Sheets.	—	30 @	—
Iron—Glengarry.	—	35 @	—
Eglington.	—	35 @	—
American Soft, No. 1, ton.	—	42 @	—
Oregon Pig, ton.	—	23 @	—
Clay Lane White.	—	27 @	30 @
Shotts, No. 1.	—	50 @	50 @
Lead—Fig.	—	50 @	50 @
Bar.	—	52 @	50 @
Sheet.	—	8 @	—
Shot, discount 10% on 500 bag.	—	Drop.	8 @
Buck 3/4 bag.	—	2 @	—
Chilled, do.	—	22 @	—
Steel—English, lb.	—	16 @	25
Black Diamond, ordinary sizes.	—	9 @	—
Flow.	—	4 @	—
Naylor & Co.	—	10 @	16
Tinplate—Coke.	—	57 @	60
Charcoal.	—	67 @	75
QUICKSILVER—By the flask.	—	1 @	60
Flaska, old.	—	85 @	—
BORAX—Harmony.	—	7 @	71
Powdered.	—	7 @	71
Concentrated.	—	6 @	71

## New York Metal Market.

Telegraphic advices dated Mar. 8th give the following New York prices:  
BAR SILVER—94 3/4 per oz.  
BORAX—94 @ 90.  
COPPER—LARK—\$16.30 @—  
IRON—No. 1, \$22.00.  
LEAD—\$5.125 @ 5.2.  
TIN—\$8.00.

The following is the latest by mail from the "New York Metal Exchange Market Report":  
COPPER—Steady, spot closing at \$16.00 @ 16.25. Transferable Notices (Lake) issued at \$16.40 @—  
LEAD—Firm at \$5.17 @ 5.37 spot. Transferable Notices issued at \$5.00.  
TIN—Quiet at \$8.20 @ 8.60. Transferable notices issued at \$8.10 @ 8.30.

MARKET PRICES AT TIDEWATER. 100-ton lots of listed irons (when brand is specified) range nominally about as follows: Lehigh, Grade No. 1, \$20.50 @ 21.00; No. 2, \$19.50 @ 20.00; Grey Forge, \$17.00 @ 17.50; Hudson River, Grade No. 1, \$20.50 @ 21.00; No. 2, \$19.00 @ 20.00; Grey Forge, \$17.50 @ 18.00; Southern, Grade No. 1, \$20.00 @ 21.00; No. 2, \$18.50 @—; Grey Forge, \$17.00 @—.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Feb. 16.	WEEK ENDING Feb. 23.	WEEK ENDING Mar. 1.	WEEK ENDING Mar. 8.
Alpha.....	2.15	2.35 2.00	2.30 2.00	2.65 2.30 2.75
Alta.....	2.20	2.45 2.10	2.10 1.90	2.25 2.10 2.30
Andes.....	1.50	1.55 1.35	1.75 1.20	1.40 1.70
Argenta.....			20 15	20 15 23
Belcher.....	61	7.00 5.25	65 54	61 50 55 73
Bodphy.....				
Bodphy & Belcher.....	6.50	65 55	6.50 59	6.00 575 61
Bullion.....	1.70	1.80 1.50	1.60 1.40	1.70 1.70 2.25
Baltimore.....	1.65	1.20 1.20	1.10 1.05	1.75 1.20 1.70
Belle Isle.....		70 65	70 65	70 60 65
Bodie Con.....	2.15	2.30 2.25	2.45 2.15	2.35 2.25 2.60
Bodie Tunnel.....	4.00	4.50		8 05 3.50
Bulwer.....	85	95 80	85	
Con. Va. & Cal.....	171	171 15	171 145	171 171 173
Challenge.....	5.75	6.00 65	65 65	102 55 122
Champion.....				
Chollar.....	6.10	6.25 51	6.00 55	5.75 51 55
Confidence.....	27	38 30	35 324	46 204 52
Con. Imperial.....	3.00	3.40 2.75	3.25 3.00	5.75 3.00 6.00
Caledonia.....	55	80	50 40	65 60 75
Con. Pacific.....				
Crown Point.....	7.00	7.50 65	6.25 6.50	7.50 71 80
Crocker.....		60	70 45	50 50 55
Central.....				
Dudley.....				
East E. & B.....	12	14 114	121 101	111 91 164
Essex.....	1.20	1.30	1.10 1.05	1.40 1.20 1.41
Grand Prize.....	2.00	2.20 1.95	2.00 2.00	2.05 2.00 2.05
Gould & Curry.....	5.10	5.25 4.40	5.20 4.20	4.60 4.45 4.95
Hale & Norcross.....	91	104 91	10 91	91 104 111
Independence.....		2.10		
Iowa.....			30 25	40 60 1.00
Julia.....	45	60	45	55 85
Justice.....	1.05	1.15 30	1.10 1.05	1.00 1.05 1.20
Kenrick.....		2.25	2.20	2.50 2.50 2.50
Lafayette.....	45	55 40	50 45	50 45 45
Marion White.....				
Mono.....	1.65	2.20 1.85	1.90 1.80	1.90 1.90 2.10
Mexican.....	51	51 4.95	51 51	5.50 51 6.50
Mt. Diablo.....			4.50	
Northern Belle.....				4.00
Navajo.....	1.60	1.65 1.60	1.80 1.70	1.75 1.65 1.75
North Belle Isle.....	7.25	7.50 73	7.54 7.25	7.50 6.00 7.50
Niagara.....				
New Queen.....	3.50	3.70 3.50	4.00 3.40	3.80 3.20 3.60
Occidental.....		1.70 1.40	1.65 1.50	1.55 1.65 1.80
Ophir.....	101	101 9.25	101 9.75	101 114 111
Overman.....	2.30	2.40 2.60	2.3 2.10	2.30 3.00 3.00
Potosi.....	5.75	51 4.50	5.50 4.60	51 61 61
Perrish.....	1.35	1.45 1.35	1.40	1.35 2.25 1.51
Perry.....	.60	.65 .60	.55 .50	.55 .50 .70
P. Sheridan.....		.05	.05 10	.05 .05 .05
Silver Star.....				
Savage.....	7.25	7.50 6.00	71 6.00	6.50 61 7.50
Silver Hill.....				
Slerra Nevada.....	5.25	51 4.70	51 4.35	4.70 4.55 51
Silver Hill.....	45	50	45	40 55 75
Silver King.....			5.00	5 25 5 55
Scorpion.....	30	85 70	75	70 80 85
Sulphur.....				
Sulphur Con.....	4 65	4.75 4.10	4 63 4.05	4.35 4.30 4.85
Utah.....	2.00	2.05 1.80	2.10 1.85	1.85 1.85 2.20
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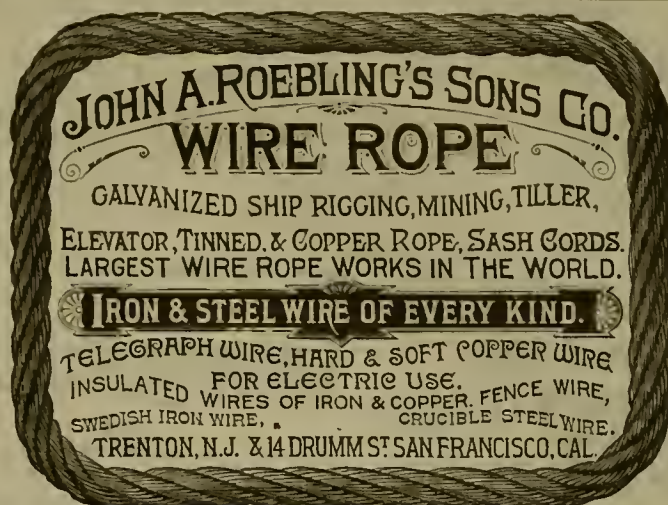
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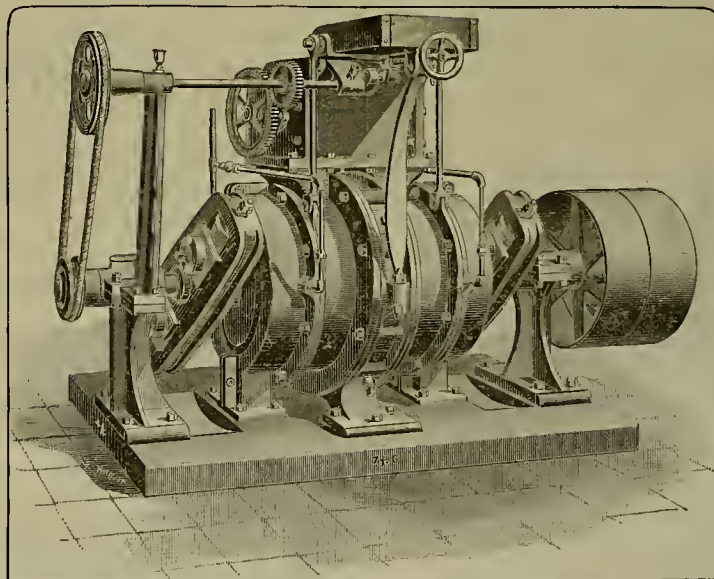
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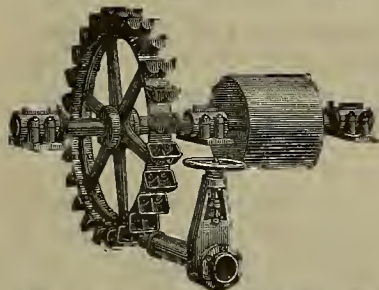
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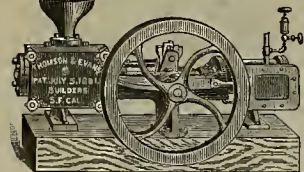
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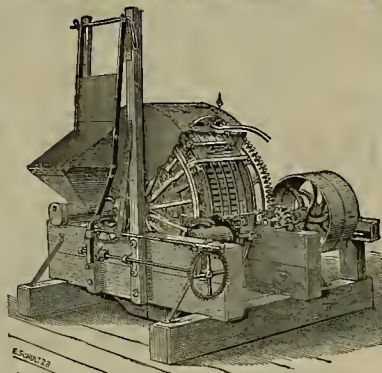
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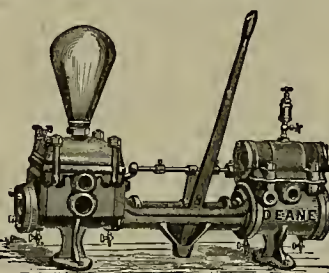
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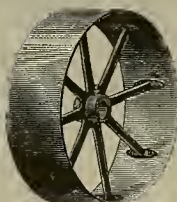
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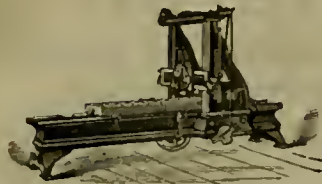
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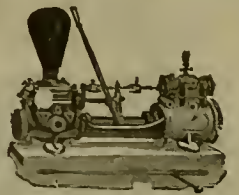


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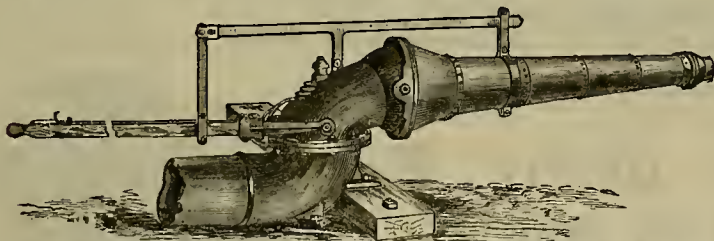
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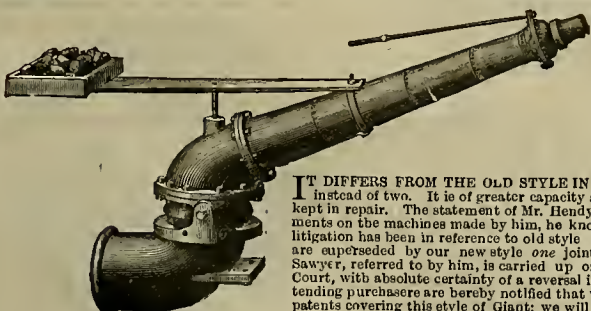


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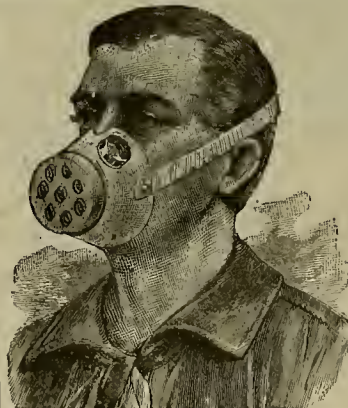


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Warranted the Best and Cheapest on the market. Can furnish Kit complete or any part of it, leaving out articles parties may have or do not want. Can furnish larger Forges with lever if desired. Also the **SCIENTIFIC GRINDING MILL "The BEST MILL on EARTH."**

Send for Catalogue.

Farmer's Forge, No. 5 B. Will heat 1 1/2 inch Iron.

Farrier's Pincers, Cast Steel, 12 inch.

Farrier's Knife, Wootenholm.

Combination Anvil Hammer and Vice, Hardened Face, Fine Polish. Weight, 2 lbs. Welson, 50 lbs.

Blacksmith's Hammer, 15 inch.

Blacksmith's Tongs, Wrought Iron, 12 inch.

Blacksmith's Cold Chisel, 1 1/2 inch Steel, 50 lbs.

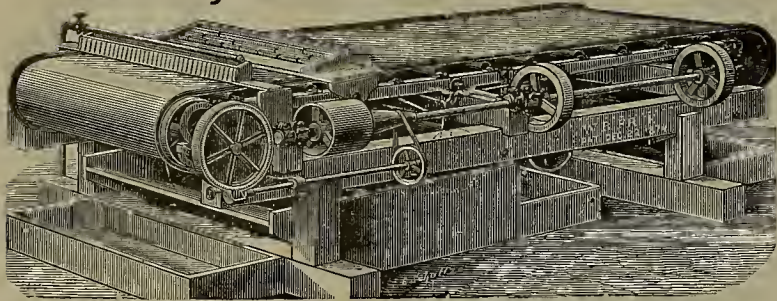
Blacksmith's Hot Chisel, 1 1/2 inch Steel, 50 lbs.

Blacksmith's Drill Press, Hand Feed, Weight, 50 lbs.

**THE FOOS MFG. CO., Springfield, Ohio.**



# \$1,000 CHALLENGE!



**THE FRUE ORE CONCENTRATOR  
OR VANNING MACHINE.**

**PRICE: FIVE HUNDRED AND SEVENTY-FIVE DOLLARS  
(\$575.00) F. O. B.**

OVER 1400 ARE NOW IN USE. Concentrators are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

THE MONTANA COMPANY (Limited), LONDON, October 8, 1885.

DEAR SIR:—Having tested three of your Frue Vanners in a competitive trial with other similar machines (Triumph), we have satisfied ourselves of the superiority of your Vanners, as is evidenced by the fact of our having ordered twenty more of your machines for immediate delivery. Yours truly,

THE MONTANA COMPANY (Limited).

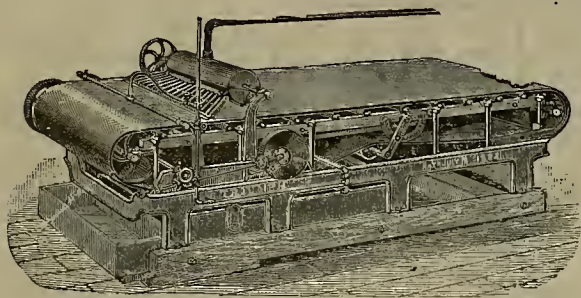
N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

ADAMS & CARTER.

Protected by patents May 4, 1889; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

**ADAMS & CARTER, Agents Frue Vanning Machine Co.,  
Room 7, No. 109 California Street, SAN FRANCISCO, CAL.**

# \$1,000 CHALLENGE ACCEPTED, PRICE, FIVE HUNDRED AND FIFTY DOLLARS (\$550.00).



**THE  
"TRIUMPH" ORE CONCENTRATOR.**

The present improved form of the celebrated "TRIUMPH" Ore Concentrator possesses many advantages over any other style of Vanners, Vanning Machines, or Concentrators, yet introduced to the notice of mining men. These advantages consist in the superior features which enter into their construction, and facilitate their operation.

They are constructed in the best manner; their frames being of iron, insures their solidity, durability, and perfect steadiness of motion when operated. They are built as compactly as their requisite strength will permit, weigh less, require less freight space in boxes, by which their cost of transportation is reduced, and occupy less mill room when set up.

An important improvement has recently been introduced into their construction, which consists of a RIFFLE TABLE placed in front of and which takes the discharge from the feed and amalgam bowl. The improvement is in the reciprocal motion which is imparted to this table by the longitudinal motion of the shaking frame to which the table is attached. We have at hand many testimonials, from well-known Superintendents of mines in different mining districts of the United States, bearing evidence of the efficiency and superiority of this form of Concentrator, and we shall be pleased to send Circulars covering such letters of testimony, and, as well, directions for setting up and operating these machines, and are ready to quote special prices for any considerable order.

**JOSHUA HENDY MACHINE WORKS,**

**Nos. 39 to 51 Fremont St.,**

**San Francisco, Cal.**

WM. H. TAYLOR, President.

R. S. MOORE, Superintendent.

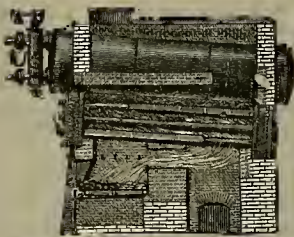
L. R. MEAD, Secretary.

# RISDON IRON & LOCOMOTIVE WORKS

Location of Works, S. E. Cor. Beale and Howard Sts., San Francisco.

Manufacturers and Sole Agents for the Pacific Coast for

## HEINE SAFETY WATER TUBE BOILER.



Has the Following Advantages:

**SAFETY,  
DURABILITY,  
ECONOMY,  
AND FACILITY OF INSPECTION and REPAIRS.**  
60,000 Horse Power now in use.

Boilers can be seen working in San Francisco at Palace Hotel, Spring Valley Water Works Hueter Bros. & Co., California Jute Mills, and other places.

Guaranteed More Efficient than any other Boiler made.

### BUILDERS OF

QUARTZ MILLS—Gold and Silver, Copper and Lead Smelting Works, Roasting Furnaces of all kinds.

AIR COMPRESSORS—Rope Power Transmission.

HYDRAULIC PUMPING and Hoisting Machinery.

WROUGHT-IRON WATER PIPE a Specialty. Note.—Have just completed order for 36 miles of 44-inch

pipe of 4-inch iron for Spring Valley Water Works Company, San Francisco.

SAW-MILL MACHINERY of all kinds.

STEAM ENGINES—Corliss, Slide-Valve, Poppet Valve Automatic, Single, and Compound.

SOLE MANUFACTURERS for Pacific Coast of the Celebrated "Heine" Patent Safety Boiler (Water Tube);

60,000 horse power now in use.

MACBETH PATENT STEEL-RIM PULLEYS—Fifty per cent lighter and 25 per cent cheaper than cast-iron pulleys, will not break in transportation.

REFRIGERATING MACHINERY for Steamships, Breweries, and Cellars.

WILSON'S PATENT GAS-PRODUCER.

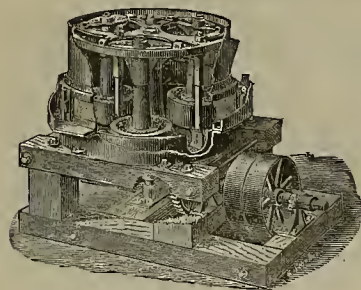
STEAM BOILERS of all descriptions.

SUGAR MACHINERY—Sugar Mills, Vacuum Pans, Clarifiers, Double Effects, etc.

STEAMSHIPS—Steam Yachts, Marine Engines and Boilers, Screw Propellers, Centrifugal Pumps, Steamships, Steam Capstans, Cargo Winches, etc.

Builders of 120-stamp Gold Mill for the Alaska Mill and Mining Company; 60-stamp Mill for Quartz Mountain Mining Company.

Send for Circular and Price Lists.



Centrifugal Roller Quartz Mill.

## F. A. HUNTINGTON,

MANUFACTURER OF

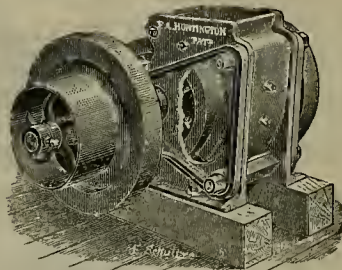
## Centrifugal Roller Quartz Mills, CONCENTRATORS AND ORE CRUSHERS,

Mining Machinery of Every Description,

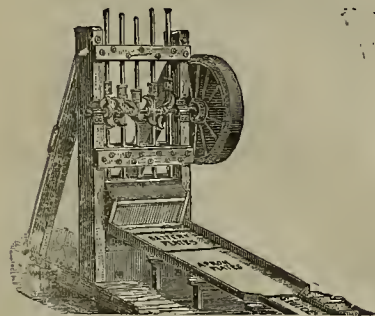
## Steam Engines and Shingle Machines.

SEND FOR CIRCULAR.

No. 45 FREMONT STREET, - - SAN FRANCISCO, CAL.



ORE CRUSHER



## ATTENTION, GOLD MINERS!

WE ARE SELLING

## Silver-Plated Amalgamating Plates

For Saving Gold in QUARTZ, GRAVEL and PLACER MINING,

At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best, and far superior to others in weight of silver and durability. Old mining plates replated. These plates can also be purchased of JOHN TAYLOR & CO., cor. First and Mission Sts.

SAN FRANCISCO GOLD, SILVER and NICKEL PLATING WORKS,

E. G. DENNISTON, Proprietor.

653 & 655 Mission St., San Francisco, Cal.

NOTICE.—Mining men are cautioned against fraud in purchasing poor mining plates made in this city; they have proved defective in the Silver-plating, and in having much less Silver than was contracted for. When in doubt make an assay; thin, light Silver-plating looks the same as heavy. SEND FOR CIRCULAR.





# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MARCH 17, 1888.

VOLUME LV.  
Number 11.

## Electrical Power for Mining Purposes.

The PRESS has several times during the past year called attention to the fact that there are many places in this State, and on this coast, where electricity could be utilized for driving quartz-mills, pumps, hoists, etc., in mining and milling operations. In the central and northern part of California there is plenty of water-power, but it is not always exactly where wanted. But by means of a water-wheel and dynamo, electricity may be generated and conveyed to any reasonable distance and then applied to any power purpose desired. This is done elsewhere, and there is no reason why it should not be done here. There seems, however, to be an idea that this is more or less of an experiment, and everybody wants somebody else to try it first. While many persons know that electricity is utilized for small motors, they are skeptical as to its availability for any large power. This is, however, only a question of size of dynamo, motor, and quantity of original power.

There seems to prevail a rather bazy notion about electric motors and dynamos, whereas the matter, as far as principle goes, is quite simple. A dynamo or electric generator does not run by electricity. It is by its means that electricity is produced, but it must be run by another power, just as a pump or anything else is run. A steam engine or a water-wheel must furnish the power to run the dynamo. Then when it is in rapid motion it generates electricity, which is conveyed by a wire to the point where the motor is placed. This motor is just like a dynamo, running reversed. This runs very rapidly indeed and must be geared down by belts, gears or other device to suit the requirements of the machinery it is to drive. The power thus derived is subject to control, and the machinery may be started and stopped as desired. The idea that many have that an electric engine runs in some way on its own book is entirely wrong. The advantage to be gained is that the power may be transmitted to long distances—several miles—from its original source without having to use belts, wire ropes or other moving objects. The plant once furnished, where there is water-power, there is no further expense outside of ordinary maintenance. As will be seen by an article in this number of the PRESS, the Big Bend Tunnel Company is about to run its machinery on the river by means of this power.

The Alien law applies only to Territories and the District of Columbia. There is no law that prohibits an alien from purchasing and working mines in California, Nevada or any other State, but he cannot acquire title to a mine by location, as that right is reserved to citizens of the United States or those who have declared their intention to become such.

## The Economizer Engine and Boiler.

The accompanying cut presents an illustration of a simple, substantial form of a center crank portable engine and boiler, aptly denominated the "New Economizer."

The boilers are constructed especially with a view of insuring the consumption of a minimum amount of fuel. The engines are built either with center or side cranks; they are perfectly balanced, and vibration at the maximum of labor is reduced to the least possible amount. They can be run to a very high speed and are so mounted that they can be detached from the

## Saving the Mineral Lands.

The Montana people are evidently in earnest in the matter of preventing the railroad company from absorbing the mineral land in their land grants. The residents of various sections are subscribing liberally to the fund to send representatives to Washington, notwithstanding the report by interested parties that only a junketing trip will result. Outside of the petition and affidavits, the case will be presented in Washington by men selected to do so, and it is very probable that they will accomplish their object. Although the mineral

## Oil in Life-Floats.

Captain Herbert H. Williams of Thomaston, Maine, has obtained a patent through the MINING AND SCIENTIFIC PRESS Patent Agency on an attachment to a life-float, buoy or life-preserver or anything of the kind designed for supporting bodies in the water and preserving life. Capt. Williams provides such floats with a reservoir for oil, this reservoir having a novel outlet, whereby the oil may escape automatically, no matter on which side the float or ring buoy may be turned when thrown into the water, or to which it may be thrown by the waves, when once in the water.

The general and well-known object is, by means of the escaping oil, to calm the surrounding water sufficiently to enable the float to be discovered at a longer distance than it otherwise could be, and also to provide for a calm space about the float for the preservation of life and the convenience of the person supported by the float. The common ring-buoy, used for the purpose of throwing to a man who has fallen overboard, is provided with a reservoir for oil, so arranged that the oil will escape automatically, without reference to the position of the buoy when floating.

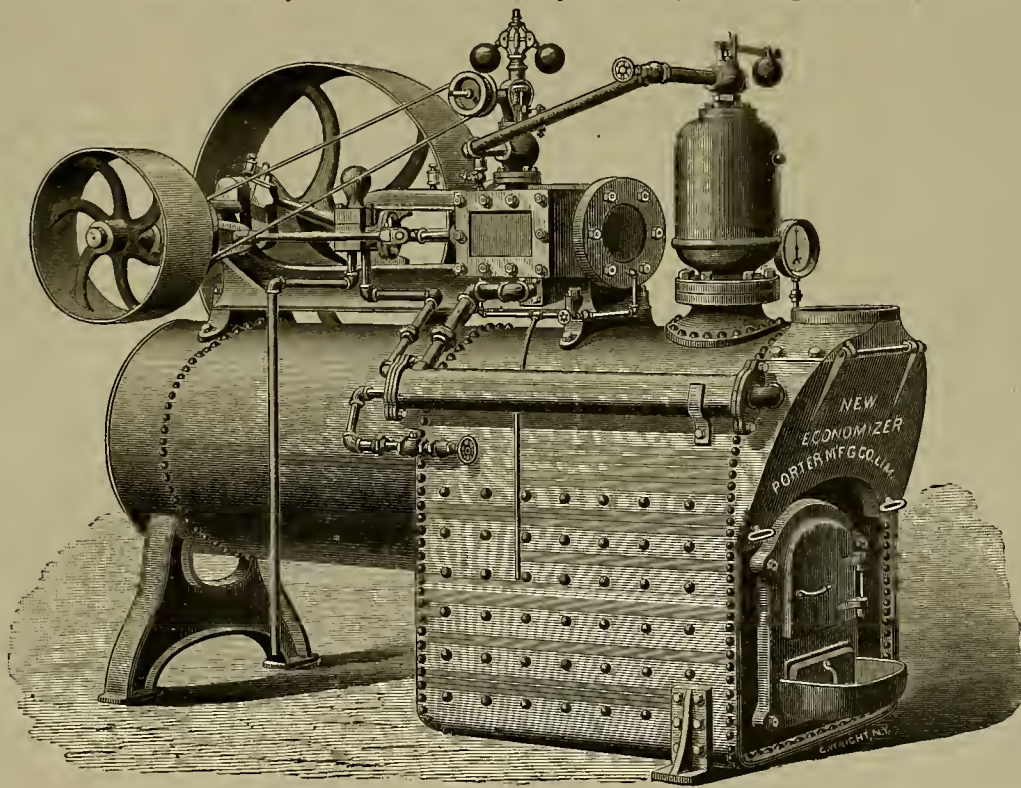
It is not new to supply oil reservoirs to life-rafts, but these have generally had a complicated system of cocks and outlets to allow the oil to flow. The plan has not been adapted to the common life-buoy, and, moreover, there has been no arrangement to provide for the automatic flow of the oil.

In Captain Williams' life-buoy a pipe encircles the buoy and forms a reservoir for the oil. It may be placed inside the buoy or outside.

Wherever placed, an outlet pipe leads from the encircling reservoir in the direction of one side or surface of the buoy, and a similar outlet pipe leads in the direction of its other side or surface. When the buoy is hung up in the usual manner these outlets are at the top, and the oil cannot flow out. But when the buoy is launched overboard, no matter on which side it may fall or on which side it may subsequently turn by the action of the waves, the oil will flow from the outlet which then happens to be extending downwardly. This is the advantage of the double oppositely arranged open discharge from the reservoir. No matter what may be the construction of the reservoir itself, the oppositely arranged open outlets may be applied with equal advantage and in every kind of life-float.

PROSPECTORS who have recently been to Death Valley say the country is full of quartz veins. These men think they will find the famous Breyfogle mine which has been the dream of prospectors for years.

It takes 270 inches of water to run the 40 stamps and 20 pans of the Chollar mill,



THE "NEW ECONOMIZER" PORTABLE ENGINE AND BOILER.

top of the boilers and placed on separate foundations and used as stationaries, and as such can be operated as either right or left hand, as the power can be transmitted from either side.

They can be mounted either on wheels or wheels, as the conditions of use may require. Mounted on skids, these "New Economizers" are built of a capacity of from 3 to 20 horse power, and will be found serviceable for pumping water, sawing wood, farm and dairy uses, running small machine-shops, sewing machines, and for many other purposes where small powers may be required.

Mounted on wheels, they form agricultural engines complete for threshing, and have been found very successful as straw-burners, and with a simple change of grates are equally well adapted for burning either wood or coal. Numbers of these engines are being sold by the Joshua Hendy Machine Works, the Pacific Coast agents.

GOVERNOR WATERMAN has purchased the interest of Juan M. Luco in the Stonewall mine. This leaves the Governor sole owner of that valuable property.

land is specially reserved from railroad grants, and there is a law against its being taken up as agricultural, a great deal has been taken out of the public domain. This, of course, reduces the area for prospecting and puts in the hands of private parties tracts which should support the mining population.

This has occurred to a greater or less degree in all the Pacific States and Territories. Attention has frequently been called to the matter, but no such vigorous steps have been taken to prevent the unlawful absorption of the mineral lands as those the Montana people are now taking. Their efforts will result in bringing the subject forward as it should be. If matters go on in the way they have for some years, it will not be long before a large proportion of the mineral lands belonging to the United States will be in the hands of private parties.

FOUR companies are mining near Rye Patch and one company is working in San Jacinto, west of that place.

THE Father de Smet and Deadwood-Terra mining companies are not to be consolidated, as reported.



## CORRESPONDENCE.

We admit, unindorsed, opinions of correspondents.—Eds.

## Calaveras County Mines.

## Copperopolis.

EDITORS PRESS:—Copperopolis, after a sleep of many years, has been jostled, put on its feet and set going by the present activity in the copper market. The town looks to the Union copper mine for its support. When in 1866 this mine closed down, Copperopolis put up her shutters, "called it a day and quit." When in January, 1888, the mine resumed, Copperopolis took down, one shutter at a time, her closed-up fronts, and is still suspiciously thinking it too good to be true and keeping a few closed. But the croakers will soon give way before the active operations of the Union mine. The Union copper mine was discovered in 1860 and became the property of Messrs. Ames & Glidden of Boston, by whom it is at present owned and operated. The mine is secured by a U. S. patent and covers 200 feet in width by one mile in length. In January last Messrs. Ames & Glidden concluded that if there was anything in the mine it should be worked or sold, or if worthless, shut down, as the expense of watchmen, repairs and taxes had cost them the snug sum of \$50,000 during the mine's idleness. Accordingly, their agent, Mr. H. D. Randlett of San Francisco, put the well-known copper superintendent, Mr. J. H. Ferson, in charge, and a charge it proved to be, for in consequence of the many years' idleness, the machinery had well-nigh fallen to pieces. With the mine filled with water all these years, the timbers had decayed so that when the water was taken out cave after cave occurred, and at times it seemed as though the old workings must be abandoned; but skill, experience and patience overcame these obstacles and the mine was once more opened for examination. To the surprise of the superintendent it was found that the ore bodies were almost intact, and the character of the ore and value far above his most sanguine expectations. The ore proved to be not only free from all conflicting metals, but to contain a larger average per cent of copper than any like mine on the coast, and of greater body. The vein carries an average width of 15 feet, with 16 per cent copper, and with drifts and shafts to prove its character for 1000 feet.

The surface developments are four shafts on the Union proper of 300, 500 and 550 feet depth, covering 1000 feet on the length of the lead. On the Keystone, a side location tapping the vein on its pitch, and proving its character for a distance of 1500 feet, are three shafts of an average depth of 300 feet. At each 100 feet, levels have been run an average of 1000 feet. In consequence of these thorough and extensive developments, all that remains to be done is to rebuild the hoisting and pumping plants and the mine with its large bodies of high grade ore is all ready for stopping and can soon make a record for itself as a copper-producer. Working but one shaft with a limited force has enabled the superintendent to ship 700 tons, with the ore-sheds full of ore awaiting shipment. Once the machinery is reconstructed, the mine can excel its former record of 70,000 tons from 1860 to 1866, as thousands of feet only want stopping. It is reported at Copperopolis that an English syndicate will purchase and operate the mine. Why our California capitalists should allow so good a thing to go out of our country is a mystery. Messrs. Ames & Glidden are well-known railroad men and manufacturers, with no desire to continue in mining, and hence offer the property for sale at a price far below the actual cost with the question of present value not considered. Developed as the mine is, it may easily be examined and tested. With an immense amount of ore in sight, copper high in percentage (16), and the price of copper going higher, with no possibility of a fall for two years at least, but every reason for an advance, makes the ownership of the Union copper mine an assured bonanza to whoever may become the fortunate possessor. E. H. SCHAEFFLE.

Murphys, Cal.

## More Light!

EDITORS PRESS:—Can you inform me if the scientific gentleman who invented the cosmic ether devised any plan by which that imponderable, perfectly elastic fluid which permeates and traverses all ordinary matter without resistance, and which admits of the passage through it of any body of any form and with any velocity equally without resistance, can impart to our organs of sight, either directly or through the agency of air, those vibrations which produce in our brains the sense of sight?

It would seem that a fluid such as the ether is said to be, and such as it must be in order to fill the role assigned to it, could not have friction nor impact upon gross ponderable matter, could not hit anything, so to speak, and consequently would find a difficulty in imparting any vibrating, undulatory or other mode of motion which it might cherish in its own bosom to any body else, and I feel uneasy about it; and if it cannot, how is it that it does? or does it? or is there any such fluid? and if there is not, how does light contrive to crawl through a hole which is plugged by a vacuum? EN!

## Mines and Mining in Mexico.

## History of Minas Nuevas or "New Mines," State of Chihuahua.

EDITORS PRESS:—These mines were discovered in the early part of the 15th century by the Jesuit padres and caused a great excitement at the time because of their extent and richness. Soon after, the city of Hidalgo del Parral was founded on the Rio del Parral.

The mines, which were very rich, even on the surface, were worked in a primitive way by Mexican Indians, peons, under the direction of the padres. Notched poles were the only ladders used. All ores taken out had to be brought to the surface on the backs of peons, and turned over to the padres, who had them packed to their smelting works and arastras near Parral for reduction.

These Indian peons were very superstitious and nothing could induce them to extend their works more than 200 feet below the surface. At all times they had to be closely watched to keep them from pilfering the rich ore. They received for their labor, rations, meted out to them, barely sufficient for their support, and were obliged to go nearly naked.

These mines have been continually worked since their discovery with occasional interruptions caused by revolutions and by raids of the hostile Apaches and Yegui Indians, both powerful tribes, able, when combined, to hold their own against the troops sent to subjugate them.

The Jesuits built fine churches at enormous expense with a part of the wealth taken from the mines, though the larger portion, in their early history, fully three-fourths of the silver extracted, was sent to Spain. The City of Hidalgo del Parral was also built from their proceeds. We are without exact knowledge as to the amount of money taken from these mines, though it is known to have amounted to many million ounces of silver.

Parral flourished and became a city of many thousand inhabitants, but the frequent changes in the Government and other causes reduced the power of the Jesuits and the prosperity of the city, and the mines took a backward course. In consequence of this interference by the civil authorities, the Jesuits partly abandoned these mines about 1740, as the records show. After this the underground workings being neglected, went to decay. The blocks and pillars of ore left to support the openings, through the effect of moisture and exposure to the air, crumbled away and the vein matter and the walls being without support caved in, filling up the stopes and drifts. Timbering was not practiced here, and the vein being large, in many places over 40 feet wide, and the ore soft, the mine, as a matter of course, soon became unsafe and badly blocked up.

Though they have in part been worked so long and have turned out so much bullion, these mines, so far as exploration goes, may be said to be comparatively new. Only a few of them have yet been worked to a greater depth than 300 feet on an incline of 55 degrees. The deepest workings here are of modern date, and are yet fully 350 feet above the line of permanent water. The modern are more than 100 feet deeper than the ancient workings, the vein still continuing of great size and the ore very soft, owing to which condition of things large pillars and blocks of ore have still to be left standing to support the walls and the openings.

For many years there was little done to give the city of Hidalgo any life. During the past few years foreigners becoming aware of the value of these mines visited and found them mere "gopher holes," none of them developed over 200 feet below the surface.

By their superior knowledge of mining and their influence with the more wealthy class of Mexicans these foreigners have been able to explore the mines to greater depth. During these more recent years nearly every mine on the vein has had new shafts sunk in solid ground to the depth of 450 to 600 feet, the shafts on the Vetta ground and the Verdi mines having been sunk to a depth of 1150 feet.

The vein grows more solid and ore is of higher grade as depth is reached.

There are now five steam hoisting works on this vein in successful operation. The average ore from the lower levels exceeds 100 ounces silver per ton. The vein extends from point of discovery north 25° west, over three miles without a break, being in no place less than 18 feet between walls. A. J. HOLMES.

Parral, Chihuahua, Mexico.

CON. CALIFORNIA AND VIRGINIA.—The official account of the bullion produced by the Con. California and Virginia during the month of February is as follows: There was worked at the Morgan mill 5000 tons of ore, yielding bullion valued at \$150,214.88, of which \$68,830.65 was gold and \$81,384.23 was silver. The yield in bullion per ton was \$30.04, and the average assay value of the ore per ton per battery samples was \$39.46. There was worked at the Eureka mill 8270 tons of ore, yielding bullion valued at \$186,130.56, of which \$85,356.82 was gold and \$100,773.74 was silver. The yield in bullion per ton was \$22.50, and the average assay of the ore per ton per battery samples was \$31.79. The total amount of ore worked was 13,270 tons, and the total amount of the bullion produced was \$336,345.44. The average yield in bullion per ton was \$25.34.

## The Firewood Business.

The high price of coal and the better use for their time which wood-choppers in some parts of the State are finding, has brought prices of stove wood and charcoal to an elevation not known during recent years at least. The managers of the Donabue road in Sonoma county have issued a circular intended to stimulate the production and shipment of wood over their line to San Francisco. Though the circular in some respects seems to be written in the interest of the transportation traffic rather than of the wood-producer, the statements are interesting enough to warrant publication:

It is a well-known fact that for the past four years the wood business has been carried on at almost a loss to the producers; they have made but little above the actual cost of production. This not only applies to those producers situated where their transportation must be by rail, but the same applies to producers on the coast where transportation to this market is by water. The larger part of the wood coming to this city comes from the coast and balance by railroads leading to the bay. Heretofore on account of the great supply from the coast, prices have been kept down, as buyers use inland producers to beat down prices on the coast and use coast producers to beat inside prices, but the time has come that this can't be done. The coast producers have to a large extent quit making wood and have turned their attention to lumber, railroad ties, posts, pickets and shingles; their reasons for doing so are two-fold. First: On account of the low prices obtained heretofore, and more profit in making the above articles. Second: The fact that they are well aware that after cutting their wood they cannot get it to a market on account of the scarcity of vessels.

For the past six months the demand for vessels to carry lumber, shingles, posts and railroad ties has been so large for San Pedro and San Diego that tugs have been employed to tow sailing vessels from the Sound, Humboldt and Mendocino to the southern coast ports to save time, and the same vessels towed back empty. It has been almost impossible to charter at all for San Francisco, and there are very few vessels engaged in carrying wood. Sailing vessels prefer lumber, etc., to wood, and owing to the difficult and dangerous places for loading, and the high rates of insurance on vessels going to those places, they are asking higher rates for carrying wood than for lumber. It is almost impossible to get a vessel to go for wood at any price. If this is the case during the winter months, while there is hardly any building going on, what can be expected in the spring and summer, when the demand for lumber will be ten-fold greater? The woodmen on the coast can see this and also see that there will be a very slim chance to get wood to market after it is cut, and for that reason are not wasting time and labor in that direction. Even during the winter the demand for lumber in the southern part of this State is far in excess of the supply. This being the case, there is no chance of coast wood coming to San Francisco in any amount. This will cut off at least 50 per cent of the supply and throw almost the entire wood business on to the railroads, and the supply being below the demand, good rates will rule. Wood is selling for more in San Francisco now than at any time in the past ten years. In fact, it is readily taken at almost any price. The largest consumers of wood are the brick-yards, and they have heretofore had more or less wood left over to start the next year's work, but this year they are entirely out of wood and almost out of brick. They must start to making brick as soon as the weather will permit (probably by May 1st), and must have wood at any price. They cannot use anything else. Where is it to come from unless you benefit by this warning and be prepared to meet this coming demand at good liberal rates? You cannot expect to meet this market with green wood after the rush comes.

In order that you may know about who and what the different woods are used for, I will take each separate.

**Pecked or Tan Bark Oak.**—The highest priced wood that comes to this market. It is used principally by the Chinese for stove use and is cut up small. Also used for stove wood by those who prefer wood to coal. Price ranges from \$9 to \$11 per cord when delivered here.

**Block and Live Oak.**—Cut into stove wood and used in place of coal. Also used in some cases for steam fuel. Price ranges from \$8 to \$9.50 per cord.

**White Oak.**—Used by brick-yards and for steam fuel. Price ranges from \$7 to \$8.50 per cord.

**Pine or Fir.**—Used by brick-yards in preference to any other kind of wood. Also used exclusively by the bakers. This is the ch-ch wood and more in demand than any other. Price ranges from \$8 to \$10 per cord.

**Redwood.**—Used by brick-yards and for kindling wood by wood-dealers and the Chinese. Price ranges from \$7 to \$8 per cord.

**Tan Bark.**—Used by tannerie exclusively. Price ranges from \$17 to \$20 per cord.

**Charcoal.**—Used by the Mint, all hotels and restaurants, and by the Chinese. Price ranges from 45 cents to 60 cents per sack.

The rate of freight on above articles to Tiburon will be as follows:

Kind.	Cloverdale and points south.	Points north of Cloverdale.
Pecked or tan bark oak.....	\$2.50 per cord	\$3.00 " "
Block and live oak.....	2.25 " "	2.50 " "
White oak.....	2.00 " "	2.25 " "
Pine or fir.....	2.25 " "	2.50 " "
Redwood.....	1.87 " "	2.00 " "
Tan bark.....	3.15 " "	4.00 " "
Charcoal.....	24.00 " car	30.00 " car

The above rates are for carloads of eight cords of four-foot wood.

When cutting for San Francisco market cut only four-foot wood, as stove wood will not sell. It would be well to consider the fact that a little care in trimming the knots down close when chopping wood increases its value from 50 to 75 cents per cord. The schooner rate on all kinds of wood from Tiburon to any brick-yard, Oakland or San Francisco, is \$1 per cord in lots of 32 cords or over (32 cords being a schooner-load). Along the line of the Cloverdale & Ukiah railroad there are large quantities of fine, large white oak timber, and to those in that section I would state that Ludwig & Kroncke of the Santa Rosa Planing-Mill have made a liberal offer for white oak logs. They will pay \$8 per 1000 feet for white oak logs (cut from the body of the tree between branches) in lengths of 8, 10, 12, 14 and 16 feet delivered on car at any station on C. & U. R. R. and S. F. & N. P. R. R. This is for the full measure of the log inside the bark at the small end of log. This will pay about 45 per cent more than cutting same into cord wood, and balance of the tree can be cut into wood. As the body of the white oak is very large and straight, this item is worthy of attention. They will also buy laurel, maple, locust, ash and oak logs, delivered on cars, at good prices.

In the near future this company will transfer cars from Tiburon to San Francisco, thereby giving shippers a better market and a saving on schooner transportation.

CHAS. THORN, JR.  
General Freight Agent.

## Academy of Sciences.

At the regular meeting of the California Academy of Sciences on Monday of last week, Dr. Harkness presided. Gilbert Palache was elected a life member. The following articles were presented: Shells, by H. W. Turner; fossil shells, by Dr. Harkness; cretaceous fossils from Alaska, by Mr. Tallant. There were received 68 publications as presents to the library. A well-drawn map of Kodiak hay, Alaska, was presented by Adam Petroff of Alaska Territory.

Waldemar Lindgren of the United States Geological Survey, who has recently returned from Lower California, read an interesting paper on "Some Topographical Features of Lower California." He described minutely the topographical features of the northern portion of the California peninsula adjacent to the American boundary. The peninsula is about 100 miles broad; of this, 40 miles is desert country and 60 miles mountainous. The coast slope contains a few small fertile valleys, but is principally of granitic nature and maintains vegetation for a very few months in the year. After this slope is crossed the country is made up of large fertile valleys elevated 1900 feet above the level of the sea. Trees are few, and consist principally of live oak and a species of mahogany. There are no timber trees in the whole country from east to west. The plateau has a very rapid descent which stretches for 40 miles to the coast of the Gulf of California. The minerals in this country are few. Copper has been found in limited quantities. The gold vein, which is no doubt a continuation of that found in Los Angeles and San Diego counties, is evident for about 300 miles in a north and south line, and from 15 to 20 miles east and west. No great discoveries have as yet been made there, but in the course of a few years, no doubt, many paying mines will be discovered.

A paper on "The Macroscopical Examination of Rocks" was read by Melville Attwood. This was given in full in the PRESS of last week.

The payrolls of the mining companies on the Comstock amounted to \$214,544 last month. Some camps would make a great fuss if this much money were paid for labor in six months, and would set themselves up as "bonanza" camps.

The Morgan mill on the Carson will soon commence the erection of a refinery to run in connection with its milling works. The lumber is already on the ground and work will commence immediately.

On the Carson river the run this year will be simply unprecedented. The snow reserves in the mountains are better than ever, and it is not coming down in floods as usual, insuring a steady season's work.

The importation of silver ore from Mexico through the custom house at El Paso during the month of February is 5425 tons, valued at \$246,919, against 5090 tons for January.

The copper mine on Harmony mountain, five miles from Winnemucca, Nev., is to be developed. There are several locations on the vein.

SUTTER CREEK, Amador county, experienced a disastrous fire last week, which destroyed a great deal of the business portion of the town.



# Death of Prof. Asa Gray.

[Written for the Press by J. G. LEMMON.]

Prof. Asa Gray, the most distinguished of American botanists, was stricken with paralysis soon after his 77th birthday, and expired January 30, 1888, at his home in Cambridge, Mass.

Prof. Gray was born in Paris, Oneida Co., N. Y., Nov. 18, 1810. Obtaining a good education at the Clinton grammar school, he then, without entering college, began medical studies in the College of Surgeons of Western New York, receiving his degree in 1831. Becoming early interested in the study of nature, particularly of botany, he left the practice of medicine to prosecute the study of botany with great assiduity under the immediate instruction of the great master Dr. John Torrey.

In 1842 he was elected professor of natural history in Harvard, but during the six years previous he had distinguished himself by the publication of several elementary works in botany that are still models of precision, simplicity and comprehensiveness.

As early as 1838 Dr. Gray with Dr. Torrey began the publication of a "Flora of North America," and ten years after "Genera of the Plants of North America," also "Manual of Botany of Northern United States." Since 1861 he has written many profound articles relating to the evolution theories of Darwin, which he accepted with great caution and with unshaken religious belief. As he himself said: "I am a Darwinian, scientifically and in my own fashion, philosophically a convinced theist, and religiously an acceptor of the Nicene creed;" in these respects resembling Prof. Agassiz and Joseph Henry.

So great has been the devotion of Dr. Gray to herbarium studies that he was able to make comparatively but few excursions. Twice, however, he escaped to Europe for the better study of certain difficult families, and he made three brief visits to the Pacific Slope. On the second occasion he was accompanied by the most renowned botanist of Europe, Sir Joseph Hooker, and it was the good fortune of the writer to receive an invitation to meet them at the State line and become their guide to several of the most interesting points for the study of trees in the high Sierra. Soon after Dr. Gray's return to Cambridge, a very valuable paper appeared on the "Vegetation of the Rocky Mountain Region," followed by several profound papers on "California Forestry."

These, with a few hurried flights into the Alleghenies, to Florida, and to Canada, were all the vacations he gave to the most wonderful mental activity, including 30 years of college lectures, the administration of a botanic garden, the forming of a great herbarium, added to frequent and often very considerable contributions to various publications, notably the proceedings of the American Academy of Sciences, over which he presided for many years, and the American Association for the Advancement of Science, of which he was also president. His able and voluminous contributions to other journals, magazines and newspapers are almost incredible in number and value.

But the great botanist was much more than an ardent, clear-sighted and profound scientist. He was a genial, social, witty, urbane, hospitable gentleman. His great amiability of character was exhibited not only to his neighbors and other visitors to the herbarium, but appeared as well in his life-long personal attention to a large correspondence, which ever increased and became more and more exacting to the last. He employed no amanuensis, writing all letters with his own hand, never left one unanswered, and seldom sent one out without an appropriate statement or a pleasant allusion.

In the year 1855 a portrait in bronze of Dr. Gray was devised by his intimate friend, Prof. Sargent, and presented to Harvard College, accompanied by a carefully prepared epitome or resume of the most important labors of the great scholar. After 15 pages of such condensation, Prof. Sargent writes: "Prof. Gray in 1872 was relieved of college duties beyond the care of the immense herbarium and noble botanical library which he had formed and some time previously had presented to the University. He was now free to take up the 'Flora of North America' and continue the work which the force of circumstance interrupted 30 years before. A flora of North America, however, in these later days is a very different thing from the floras of Michaux and Pursh, or even of Torrey and Gray. The field had widened immeasurably with the strides of discovery and the development of the science, and it demanded closer and more careful research."

As an example of the knowledge of American plants reached during the present century, it will only be necessary to point to the family of *Compositae*, which is believed to comprise from one-eighth to one-tenth of our whole flora. Michaux knew but 193 species, while Gray, 75 years later, published with elaborate descriptions 1610 species, divided among 237 genera. "Two parts of Gray's 'Synoptical Flora of North America' have now been published; the middle part of the entire flora, to wit, the *Gamopetalae*. These volumes comprise 850 closely printed pages, upon which fully ten years of excessive and seldom interrupted labor was required.

"They are masterpieces of clear and concise

arrangement and of compactness and beauty of method. There will hardly be found in any work of descriptive botany a greater display of learning, clearness of vision, and analytical powers, and few works of systematic botany have ever treated of a broader field."

"Their very excellence," Prof. Sargent continues appreciatively, "increases the loss which botanical science would suffer if any other hand were called upon to complete a work now only half finished, and upon which, at least, ten years more of constant and severe labor must be expended. And what other hand could take up this work if Prof. Gray should lay it down? Who, in a lifetime of study, could grasp the details of the great edifice which, for 50 years, has been slowly growing under his hand?"

Alas! These grave apprehensions, uttered only three years ago, are realized, and the great work is now suspended by the removal of the directing hand.

Of the high attainments of Prof. Asa Gray, the records of foreign societies bear even ampler testimony than our own. He was a member of the Royal Society of London, a member, one of the "immortal eight" of the celebrated Institute of France; and long ago he was welcomed into many of the less exclusive bodies of European savants.

Prof. Gray, from an early day, was most intimately connected with the botany of California and the Pacific Slope generally. Every

exploring expedition, every railroad survey, every private explorer, acquired materials that were sent to Harvard for study and determination. Owing to the peculiar and varied soils and climate of the region west of the Rocky mountains, a much larger number of species and more peculiar flora is found here than in all of the rest of the continent combined. And, until within a few years, much of it was unknown. With the rapid settlement of the region, and the advance of detailed exploration, there was a mutual relation of absorbing interest maintained between the Pacific Coast botanists, who hastened into the forbidding, unknown regions of mountain and desert to seize the strange plants, prepare them carefully and then forward to Dr. Gray, who as eagerly and assiduously studied and described them for publication, always mentioning with pleasant comment the collector, and also giving in his correspondence warmer commendation and encouragement, thus maintaining a close bond of sympathy and co-labor between collector and author.

Though receiving at the Harvard Herbarium from time to time the collections of botanists from all parts of the world where exploration is going forward, yet Dr. Gray often declared that nothing caused him such a glow of pleased expectation as the reception of a package of nicely prepared specimens from California or the Southwest; and it is pleasant to recall that the enthusiastic closet-botanist was kept at this welcome occupation much of the time during the past two decades.

Being thus intimately connected with our flora, aiding in its discovery, studying and naming our plants, writing to and encouraging

each of our collectors, it is with especial and poignant sympathy that the botanists of the Pacific Coast join their expressions of esteem and grief with those of the great world of naturalists that are saddened by this sudden departure of their leader in science, and their loving, helpful friend, the good Dr. Gray.

## Mineral Land on Railroad Grants.

An important case has just been decided by the Supreme Court of this State, in which the Court has found that the title to the land in question was not vested in the railroad company and judgment was given in favor of the plaintiff, thus settling title to mineral land on railroad grants. The title of the case is Chicago Quartz Mining Co. vs. John Oliver. We give the decision in full:

This is an action to quiet title. The plaintiff claims under a mining patent issued Aug. 16, 1883. Defendant under a patent issued to the C. P. R. Co., dated April 18, 1870.

The only question is whether the title to the premises in controversy vested in the railroad company under the Act of Congress entitled "An Act to aid in the Construction of a Railroad and Telegraph Line from the Missouri River to the Pacific Ocean," etc., approved

the patent in the railroad company. As stated by appellant's counsel, his contention is that "mineral land did not pass by the grant (to the railroad company), and the officers of the Land Department had no authority to designate by the patent any land which was mineral in character. The law required them to designate only such land as was non-mineral in character, and the issuance of the patent under the law, aided by the presumption which the law attaches to the performance of all official acts, was a conclusive determination that the land designated in the patent was non-mineral, and the reservation in the patent was meaningless."

The Act of Congress making the grant does not in express terms require any officer or officers of the Government to identify and exclude from the patent mineral lands lying within the alternate sections granted to aid in the construction of the road. In the original Act all mineral lands are expressly excepted from its operation, and in the Amendment Act it is enacted that the grant shall not include mineral lands or any lands returned and denominated as mineral lands. "Whatever is included in the exception is excluded from the grant; and it therefore often becomes important to ascertain what is excepted in order to determine what is granted." (Leavenworth, etc., R. R. Co. vs. United States, 92 U. S., 733.)

It is not claimed that the officers on whom was devolved the duty of issuing patents for the lands granted could add anything to the grant. But it is claimed the patent is conclusive evidence; that the grant included all the land covered by the patent. The Supreme Court of the United States has said: "A patent may be collaterally impeached in any action, and its operation as a conveyance defeated, by showing that it had no jurisdiction to dispose of the land; that is, that the law did not provide for selling them, or that they had been reserved for sale or dedicated to special purposes, or had been previously transferred to others." (Smelting Company vs. Kemp, 104 U. S., 636.) This is quoted approvingly in the opinion of the court, delivered by Field, J., in Wright vs. Rossherry, 121 Id., 488.

In McLaughlin vs. Powell, 50 Cal., 64, the plaintiff in ejectment introduced a patent to the W. P. R. Co., from which he derived title to the demanded premises similar to that relied on by appellant in this case and rested. "The defendant then offered to prove that the land was mineral land, containing large quantities of cinnabar and quicksilver, and that he had held the land as a mining claim since October, 1866, under the rules and regulations and customs of miners in the district where the land was situated. The plaintiff objected to the testimony as irrelevant and the Court sustained the objection. The plaintiff recovered judgment and the defendant appealed from the judgment and from an order denying a motion for a new trial." This Court said: "The exception contained in the patent, introduced by the plaintiff, is part of the description, and is equivalent to an exception of all the subdivisions of land mentioned which were 'mineral' lands. In other words, the patent grants all of the tracts named in it which are not mineral lands. \* \* \* We think the defendant should have been allowed to prove that the demanded premises were mineral lands." The judgment and order were reversed.

The doctrine laid down in that case, if applied to the case now in hand, is decisive of it. And we think it in harmony with the cases decided by the Supreme Court of the United States. It has not been overruled in any reported case in this State, although it is claimed to have been in the unreported case of Central Pacific Railroad Company vs. Leavenworth. No opinion was filed in that case, and we are unable to determine from the record that this question was passed on in that case.

Those portions of Finding three which are alleged to be unsupported by the evidence are, in our opinion, immaterial. It is therefore unnecessary to determine whether the evidence is sufficient to justify them. The material facts found are supported by the evidence.

Judgment and order affirmed.

It is reported that the mill at Grantsville, Nevada, will be started up to run on ore from mines in Shamoock canyon. The mill has been idle a long time.

At the Clayton smelter, Idaho, coke costs \$30 per ton. Half coke and half charcoal are used. Clayton is in Custer county, 25 miles above Challis.

THE American Asphalt Co. of Utah are putting up machinery to reduce the crude asphaltum and convert it into a number of forms for the market.

A CARLOAD of borax has been taken from a lake in the vicinity of Rawlins, Nevada, and sent to the Laramie Chemical Works to be tested.

ORES from Choquea district, 30 miles north of Ruby City and the Salmon river mines, carry both lead and silver.

GOLD-BEARING QUARTZ has been found near Rockville, Maryland, and has caused some local excitement.

It is said that a single blast in the Delhi mine, Nevada county, recently, blew out about \$10,000.

THE Idaho mine, Nevada county, in this State, has paid 221 consecutive dividends.



THE LATE ASA GRAY.





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SAN FRANCISCO

Saturday Morning, March 17, 1888.

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## Business Announcements.

[NEW THIS ISSUE.]

Mining Machinery For Sale—Big Bend Tunnel &amp; M. Co.

See Advertising Columns.

## Passing Events.

The recent terrible storm at New York and throughout inflicted damages to the extent of millions of dollars. It was altogether unprecedented. Railroad and telegraphic communication was stopped entirely, and ordinary street traffic discontinued. Vessels were sunk and many people frozen.

The disaster at Grass Valley from the fire in the drying-house, resulting in explosion of powder and loss of life, ought to be a warning to mining companies not to keep high explosives in any such place. The quantity kept in the drying-house was "for the convenience of the miners," but such a custom should be discontinued.

There is now talk of some good mining-fields in the Big Horn country, Wyoming. This region has frequently been highly spoken of, but there have been no very startling developments. Still it is recognized as a field for prospecting.

There is an abundance of snow in the mountains of this State, assuring a good water season this year.

THE Ontario mine of Utah has produced \$20,000,000 and paid \$9,000,000 in dividends within 10 years.

## Black Hills Tin.

A few weeks ago a shipment of some 76,000 pounds of tin was received in England from the Black Hills of Dakota. Some of the blocks of ore weighed 4000 or 5000 pounds. They were sent to prove to the English that the tin ore in Dakota was of higher percentage than that of Cornwall.

Specimen bars of tin were produced in Dakota several years since, and we have one which was sent us three or four years ago. But while prospecting has been going on more or less, no marketable tin is being produced thus far. Many localities have been examined for cassiterite, but the main discoveries are generally supposed to have been confined to the Northern Black Hills.

We received a few days since some specimens of ore from G. W. McCulloch of Hill City, Pennington county, D. T. These specimens are from the Southern Hills. One piece shows black tin from the Evergreen lode, Bismarck district, Pennington county. The claim is owned by G. W. McCulloch, H. C. Pettit, J. H. McCulloch, A. L. Bishop and W. D. Webster. The other piece is "white tin" from the Dolwath lode, Hill City district, Pennington county, owned by G. W. McCulloch, H. C. Pettit and W. D. Webster.

Mr. McCulloch says he is a reader of the PRESS, and has seen no reference in it to the Southern Hills' tin mines, and thinks also that the references to the Northern Hill mines have not been complimentary. It must be remembered, however, that there are no mines developed, or ore being worked. Thus far only prospecting has been carried on. In the last volume of the "Mineral Resources of the United States," published by the Government, the following reference is made concerning the Dakota tin: "Beyond the accumulation of some piles of ore awaiting examination by concentration, the region cannot be said to have produced any tin in 1886 except specimen bars."

Our correspondent writes us that there is tin enough in the Southern Hills to supply the world, and that all they lack to prove the assertion is the capital to invest for development of their claims. They have tin ore much richer than the English companies can show. They can show mountains of tin-bearing rock in the vicinity of Hill City to anyone who will come to look. There is plenty of water and timber. At present there is a good outlook for the investment of capital. Mr. McCulloch looks for a great deal of tin property to change hands this year. The Etta Tin Co. has a small force of men at work all the time. It is sincerely to be hoped that the Black Hills' tin interest will develop into all the owners hope, for we have produced no tin in this country as yet. We shall be glad to show the specimens of tin ore to any one who will call at the office of the PRESS.

## The Portland Reduction Works.

Mr. Wm. Huntley Hampton, chemist and assayer at Portland, Oregon, writes us to correct some misstatements made in some of the San Francisco papers to the effect that the Portland Reduction Works were a complete failure. He thinks these statements emanated from certain people who would like to see the works fail—those who were unable to make it a success from lack of knowledge, or those interested in competing institutions. He then says: "The works have made three runs. The first two, under the first superintendent, were not successful, owing to lack of knowledge of silver-lead smelting." It appears from this, therefore, that there were some grounds for stating that the works had failed to do what was expected of them.

However, Mr. Hampton tells us that the last run (Feb. 1st to 7th) on the same mixture of ores, under the superintendency of Mr. Oscar Szontagh, was entirely successful, making a record comparing favorably with the best in any other locality. During the run the ores gave out, owing to the freight blockade and the rush ensuing after the cold snap, when the supply was side-tracked somewhere.

The works will start up again in a week or ten days on Cœur d'Alene lead ore and Salt Lake dry ore, and it is expected that a long-continued run will be made. The company are now preparing to erect another stack, to be

ready for use within the next two months. Mr. Hampton is not in any way connected with the Portland Reduction Works, but is desirous that those interested in mining shall know what is now being done with the works at Portland.

## Temporary Disposition of Our Arid Lands.

One of the most difficult and important problems of the day is the proper disposition to be made of the arid lands of the Central and Far West. This region consists of 12 States and Territories, comprising, as a whole, not much less than a million square miles. All of these countries contain a large proportion of these so-called watered lands, the majority of them being made up almost wholly of such lands. While these arid lands, owing to insufficient moisture, are not fit for tillage, they nearly all afford more or less pasturage, some of them producing heavy crops of the native grasses. These are the feeding-grounds of the stockmen, who at the present time number their herds by the million.

While the title to most of these grounds still remains in the United States, they have for the past 20 years or more been largely occupied by the great cattle-raisers, who, by reason of the rapid increase of their flocks, are now beginning to crowd each other in an uncomfortable way. This land being public, giving all an equal right to its occupancy, trouble is to be apprehended between these cattlemen. There have, in fact, been serious difficulties already between the herdsmen of different owners, some of whom have insisted on driving in their flocks on ranges long occupied by others and perhaps already overstocked. As a means of protecting territory so appropriated, many of the larger proprietors adopted at one time the plan of inclosing extensive tracts with wire fencing, which, having been objected to by the Government, had afterward to be removed. To aggravate the situation, the sheep-raisers are beginning now to drive in their immense flocks, insisting that they shall share the scanty pasturage with the horse and cattle men. To suffer this condition of things to continue with the chance of its steadily growing worse, if it does not lead to violence and bloodshed, must inevitably work to the detriment of this important industry.

As a means of preventing further trouble, and as a measure of relief to all, it has been suggested that these arid lands be leased in large tracts to these cattlemen, these leases to be for long terms and at a nominal rent. The only right they would secure to the lessees would be that of pasturage, to which end he would, of course, be allowed to fence in the land set apart to him. Others would be privileged to enter on this land to prospect for, take up, and work any mineral deposits it might contain; also, to locate any agricultural or timber land found upon it.

The selling of these arid lands outright, as was once talked of, is a policy that should not for a moment be entertained. A large proportion of them are known to abound with valuable deposits of the precious metals. They are also rich in the various useful metals and minerals. With the exception of the foothill belt of California, they are the sites of all our gold and silver producing territory. Our coal-fields, our lead and copper mines, our salt-beds and other natural salines are all situated in these dry and nearly rainless regions, and here is where most explorations for mineral deposits are hereafter to be carried on. What of wealth they contain we do not know, nor can we even guess. All that has been revealed may be as nothing compared with what the future will bring to light. How many Comstock may be reposing in the deeply fissured mountains of the Great Utah basin, it may take centuries to find out. The possibilities of the vast interior being so great, our Government cannot be too careful in guarding its resources against monopoly and preserving them for the common use.

The importance of such policy finds apt illustration in the history of Nevada, a country typical of all that pertains to these arid lands. Traversing that State from west to east, we encounter a succession of mountain ranges separated from each other by broad valleys, the whole having a generally north and south trend. These valleys, some of which widen out into

extensive plains, are for the most part without water or timber, but should with grass affording nutritious pasturage for a great deal of stock. The mountains, besides much grass and some scrubby timber, contain numerous small streams. Here only can a sure and ample supply of water for stock be had. Hence, every cattle range must reach to and take in a portion of these mountain lands. But these are also the sites of the metalliferous lodes. With the exception of her horate beds and other salines the mineral deposits of Nevada are located in the mountains and their outlying spurs. And it is safe to say that there is not a group or chain of mountains in the State but which contains gold or silver bearing veins that will some day be worked with profit. There is in fact hardly a mountain in Nevada in which these metals are not now being produced, and in some instances very largely. Not only so, but there is scarcely a county in the State but has some time or another shown up what may fairly be termed a "bonanza." Beginning on the west, we have Storey county with her Comstock, from which there have been taken over two hundred millions; Eureka county, in the center, has turned out at the town of Eureka twenty-five millions; the Manhattan mine at Austin, Lander county, and the Raymond and Ely, at Pioche, White Pine county, have yielded each one-fourth as much; Candelaria, Esmeralda county, is to be credited with a product of fifteen millions; and Bodie, just over the border in Mono county, with twenty-five millions. The Eberhardt, a lenticular mass of ore in White Pine county, and the Sheba, a similar deposit in Humboldt county, have turned out each between three and four million dollars, there being several camps in the State, such as Tiesarora and Aurora, that have produced from five to ten million dollars each.

It is a singular fact that the outcrop of the mines above mentioned was in no instance notable, not having differed in any case from numerous other like exposures in the neighborhood. The Eberhardt vein scarcely showed itself above ground. Nor was the Comstock anywhere prominent on the surface, the finding of some of these mines having been the result of accident. We mention this to show how easily a valuable deposit of this kind may be overlooked, and how good are the chances for finding other and perhaps many of these bonanzas hereafter, even in territory that has already been thoroughly prospected.

But not alone for their mineral wealth and as feeding-grounds are these rainless, timberless regions valuable. What their agricultural capabilities may be cannot now be foreseen, nor can they for the present be determined, though they may ultimately prove to be considerable, possibly very great. The soil throughout the larger portion of them is warm and rich, their element of sterility consisting in their lack of moisture, which perhaps the ingenuity of man and the resources of science may yet be able to supply in sufficient quantity to render them arable.

Our experience in California admonishes to caution in our dealings with these supposed sterile soils. There was a time when, through a general misapprehension of their real character, the best lands in this State could be bought for a trifle—could in some cases even be had for the asking. Now the owner of a few acres of this land is beyond the reach of want or the necessity for severe toil—he is, in fact, a rich man. We should be careful that the mistakes made here are not elsewhere repeated. The selling of large tracts of the great sage harrens of the interior must therefore be avoided. As a temporary disposition of these portions of the public domain, they should be leased in the manner mentioned, but, of course, for grazing purposes only. For every other use existing laws make all needed provision for their occupancy and final disposition.

**EXPLOSION AT THE EMPIRE MINE.**—On Wednesday morning a fire broke out in the dry-house at the Empire mine, Grass Valley, and some 200 pounds of vigrite powder in the house exploded. D. C. Trebilcock was killed and Wm. Shields, John Paul, Chas. Duval and Gordon Manning were injured. The fire caught from the stove in the dry-house. The men in the mine were immediately hoisted out. The dry-house was used for the miners to change their clothes in, but it is not a very good place to keep powder.



### The Honduras Treasure-Hunters.

And now comes the story of another hurried treasure-hunting expedition, the site of the supposed deposit being this time the east coast of Honduras. As the narrative runs, a piratical craft richly laden with gold being many years ago hotly pressed by a British cruiser which crowded the vessel close in on the coast of Honduras, the captain ran through an opening in a reef, and, landing on a sand key, buried there 36 kegs of Spanish doubloons. Two of the crew who had been badly wounded in the fight with their pursuer having died after this landing was made, their bodies were placed in the pit on top of the treasure and the whole deeply covered up with sand. This done, the survivors re-embarked and put to sea, hoping to elude the vigilance of the British man-of-war and then return and secure their booty. But in this they were disappointed; the enemy, being on the alert, attacked the freebooters, and, after a desperate fight, killed all but one of their number, a boy who was spared on account of his youth and because he succeeded in convincing his captors that he had been forced to serve under the "black flag" or "walk the plank."

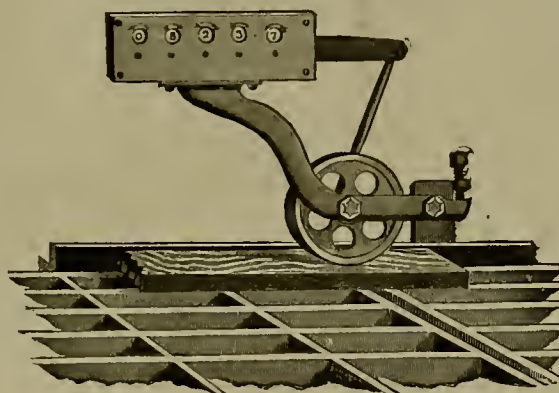
The name of this lad is not given, nor does it transpire in the narrative vouchsafed us where or how he passed his life from the date of these bloody events till the time of his death, a period covering a good many years. When he reappears, it is as an invalid in an Australian esport, old and poor. Here a certain ex-Judge Davidson of San Francisco, who is making the circuit of the world in his own yacht, falls in with the unfortunate man, and, at the solicitation of the American Consul, taking him on board his vessel, brings him to San Francisco, where he dies soon after, a victim of consumption. The ex-pirate, grateful to the ex-judge for the service so rendered him, discloses to his benefactor the above facts, giving him at the same time a chart, and describing the locality of the grand "cache" with so much fullness and accuracy that the beneficiary was afterward able to find the place without any trouble.

Not for a long time did this ex-member of the California judiciary give much thought to this story of the dead buccaneer. Being flush and in no particular need of adding to his store of wealth, he felt little inclined to undergo the dangers and discomforts of a journey to the distant and deadly coast of Honduras in search of the pirates' "loot." But having at length lost most of his money, he determined to go in quest of the booty, and accordingly did so. He found the spot, and digging down, succeeded in unearthing the remains of the two pirates who had been buried on top of the treasure, but before he could sink much further, the water came in upon him so fast that he was obliged to desist before reaching the more valuable deposits below, or even getting a sight of them. Though compelled to abandon the undertaking for the time being, the judge never lost faith in the dead man's story, nor did he relinquish the purpose of going back at some future time and prosecuting the search to determine results.

Having drifted to New York, our old Pacific Coaster not long since happened to meet there on some convivial occasion a number of pleasant gentlemen, and, becoming chatty over the wine, proceeded to relate to them the foregoing events, setting them forth with greater particularity and presenting them, of course, in much more glowing language than we have here been able to do. Having heard this strange narrative, these gentlemen, all of whom were wealthy, at once "took stock in it." A company was formed, and the ex-judge outfitted, or as we here in California would say, "grub-staked," to go down and prospect for the long-buried doubloons. The good yacht "Maria" was chartered, provisioned and furnished with a select crew, Special Treasury Agent Peck acting as master. On the 12th day of October last she left New York. Owing to a variety of mishaps it was some time before the yacht reached her point of destination. Arrived there, the company disembarked and at once commenced a vigorous hunt for the hurried spoils, but up to last accounts without any marked success. A considerable quantity of human bones with some Indian relics had been exhumed, but the 36 kegs of Spanish doubloons had not been found, nor even so much as one of them.

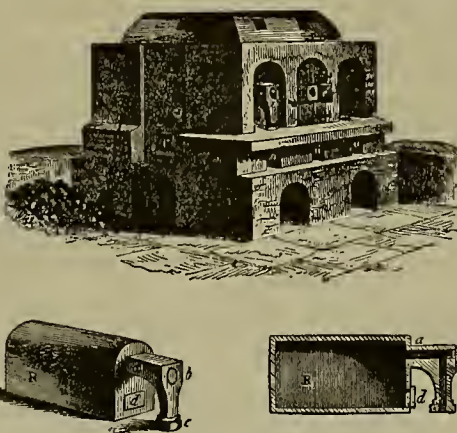
What the outcome of this expedition will be

it would not be hard to divine. It will doubtless terminate as nearly every expedition of the kind heretofore undertaken has done. We can only wonder at the credulity and folly of the people who engage in them. We are told that this ex-Judge Davidson is an old Californian. We can well believe it. The entire proceeding is characteristic of the veteran prospector. Very familiar to the resident on this coast are these artifices of the "dead-broke" Argonaut. When "strapped" he is a very Munchausen in the tales he tells about "rich strikes" made in distant localities, but which, owing to some mishap, he was not able to turn to account. As in the case of the veritable Judge Davidson, so with these old miners. The water came in and drove them out just as they reached the



HARA'S LINEAL MEASURING REGISTER.

pay-break, or the blood-thirsty savage swooped down upon them at the critical moment, or may be just then their provisions gave out; so confident were they that they had a "big thing" in sight that they staid as long as possible—at their mules, roasted their boots, nor did they leave till the last "stogy" had been devoured. If now some one would hack them up they could go straight to the spot and make a "big raisee." These are the men that know all about the "Lost Ledge," the "Gun Sight Lode" and the many other mythical finds wherewith the mining traditions of California do so abound.



SILESIAIN ZINC FURNACES.

"Yes," says this ex-judge, addressing his friends, "yea, gentlemen, it's there—a million and a half enre—with two such splendid colors in the top dirt we are bound to strike it rich on the hedrock," with a great deal more of the same sort forcibly expressed in the miner's vernacular.

As he failed to get the doubloons, why did not this impecunious person lay out a town site, having a graveyard already started? This was a great oversight; or he might have formed a company and declared dividends on the water, of which there seems to have been a superabundance. Then, too, he might have brought away the bones of the hold buccaneers and utilized them; a couple of pirate skeletons well mounted ought to have proved a drawing card in a dime museum! We fear the man failed to act with his accustomed astuteness, being an old Californian.

From the bunch of rich ore recently discovered in the Delhi mine, Nevada county, this State, four hours' crushing of four stamps turned out \$11,000 in gold. It was all "specimen ore."

The Vulture mine, Arizona, is said to be producing \$1000 a day in gold bullion.

### Metallurgy of Zinc.

In the PRESS of week before last we gave engravings of two forms of zinc furnaces, and this week show the Silesian furnace, the cut of which we take from "Phillips' Metallurgy." In Upper Silesia, where large quantities of zinc are annually produced, the apparatus employed in its metallurgical treatment differs materially from that in use at the Vieille Montagne and in other parts of Belgium. The upper cut is a general idea of the appearance of a Silesian zinc furnace. The distillation is conducted in muffle-shaped retorts, *R*, (see small cuts) of about 3 feet 6 inches in length, and 1 foot 8 inches in height. The anterior face of these is pierced with two openings, *a* and *d*, by the first of which is at-

itself. The reduced zinc passes through the aperture *c* of the bent arm, and is collected in proper vessels placed in the opening *e* left in the brickwork of the furnace. Each operation requires 24 hours for its completion, and the residue, which is a greenish semi-fused mass, is only removed after every third distillation.

The old English process of distillation per descensum is said to afford a larger produce of metal from ores of a given percentage than any other, but from its requiring a larger amount of fuel and from other causes it has become almost entirely superseded in England by the Belgian process.

By the latter method the best varieties of blende may be made and afford about 38 per cent of spelter, while calcine ore of good quality will, after roasting, afford as much as 40 per cent of metal.

The amount of coal necessary for the treatment of one ton of calcine is about 3 tons 7 cwt.; the same weight of blende will require 3 tons 15 cwt. of coal for its elaboration.

### The Big Bend Tunnel.

Electricity to be Utilized.

At the Big Bend tunnel, Butte county, this State, they are now putting in an extensive electrical plant for power purposes. The Sprague Electric Co. of New York are supplying the dynamos and motors, and furnishing the wire. The latter is No. 0 copper wire, about a third of an inch in diameter. There are two dynamo or generator of 80-horse power each, and 12 five-horse power motors for the different places along the river where the power is to be utilized. The electric power is to be used for mining purposes, such as driving pumps, moving holeders, etc. The line will come over the hill and follow along the course of the river, and there will be some 17 miles of main-line wire in all. The original power will be obtained by means of water-wheels placed about two miles below the discharge of the tunnel. An expert electrician will come from the East to place the line and machinery. Centrifugal pumps will be used in the river-bed, and these will be made in this city.

The Big Bend tunnel, which is about 12,000 feet long, has been enlarged this year and is now 13x16 feet. As there will be a great deal of water in the river this season, they will not be able to turn the water of the river into the tunnel before the month of May. They will then begin work at different points on the river-bed where it is left dry. Seepage water and pools will be drained by means of pumps.

All the work at the tunnel has been accomplished and the company has advertised in another column that the drilling machinery, tools, etc., are to be sold. Among other things, the company has started an irrigating ditch which will carry 5000 inches of water. There is a big boom in land thereabouts just now, and they can furnish plenty of water for irrigation. Superintendent Harris was in San Francisco last week buying some pumps and other needed articles.

### A Lineal Measuring Register.

An engraving on this page illustrates Hara's lineal measuring register, which is an attachment for stickere and molding machines. Its advantages are that the dials can be locked up so that it cannot be tampered with. The machine will register up to 100,000 feet, and start again at one; it can also be set back at any time in one minute after completing a job, to start at one. It can also be applied to a saw gauge so that in ripping out stuff for molding the exact quantity can be got out, thereby saving waste.

To mills that run large quantities of molding or matched stuff, this machine will give a correct record of the number of feet each man runs per day, and where a number of machines are in use, will cause a rivalry between the operators, and will thereby increase the output. Some firms who use this machine pay their men so much per thousand feet, and in a short time will make the price of machine. All the parts of this machine are interchangeable, so that should any part be accidentally broken, it can be replaced at trifling expense. Parke & Lacy are the Pacific Coast agents.

By using water-power instead of steam, the Idaho Mining Co., Nevada county, this State, saves about \$35,000 a year.



## MECHANICAL PROGRESS.

## Water Hammer in Steam Pipes.

What is known as water-hammer action is familiar to every one who has had to do with the use of water for heating purposes. The astounding noise, the violent shocks, the excessive vibrations which are set up if a little steam is formed and is then condensed in the pipes, are but too well known. Another instance of water-hammer action is supplied when boilers are blown down, or when scumming takes place, so that steam shall pass into the sea outside. A large ship will shake from stem to stern at such times, cabin doors will open and shut, crockery will go adrift, and the noise made by the water fighting its way into the vacuum and the steam trying to get out, and being condensed in the act, echoes through the ship. Scumming is known to be positively dangerous from the way, in which it shakes the boilers, bringing the scale off the tubes in flakes on to the furnace crowns, where it adheres in such quantity that they subsequently become red-hot and come down. Several years ago a curious experiment was tried by an English engineer. He took a large funnel fitted with a stop-cock and screwed the pipe into the top of a boiler containing steam of about 40 pounds pressure. He then filled up the funnel with cold water and opened the stop-cock. It would naturally have been predicted that the steam would have blown all the water out of the funnel. It did nothing of the kind. On the contrary, the water rushed into the boiler. As a result of this and several other experiments a boiler-feeder was designed and patented and worked with tolerable success. It was found, however, that it was not certain in its action, and the injector coming into high favor at the time, the inventor spent no more money on his ingenious idea. The inrush of the water was due to the fact that the steam condensed in the long pipe of the funnel and "water-hammer" action then drove the water into the boiler. Practically just below the cold water there was always a vacuum into which the water was driven by its own weight and the pressure of the air.—*Ex.*

## The Tool-Room Checks.

The value and necessity of a well-conducted tool-room can scarcely be overstated. It is one of the time-saving, labor-saving, tool-saving and temper-saving arrangements which no thoroughly prosperous establishment can dispense with. But its highest efficacy may be impaired by failure in slight details. A special feature connected with the tool-room of a large establishment should be the banding and custody of the "checks." A correspondent of the *American Mechanic*, in speaking of the use of checks, says: "Don't let the men have them to get lost or mislaid, but keep them hung upon a board in the tool room. This will be found to save time and trouble, and will always enable the tool-room keeper to know at a glance how many articles a man has out."

"But you may say that if the men don't carry the checks they have nothing to show against the statements of the tool-room keeper. The same objection could be urged against the conduct of every public library in the country. If the tool-room man is not honest, he does not belong to any system that I care to talk about. But with an honest and careful man in the tool room to take care of the checks, you will have less trouble than if they are scattered among 40 workmen, most of whom are honest and some of them careful. While five checks would be enough for most men, some others would need ten, and two or more classes would thus be formed. Instead of counting the checks as they hang upon the pins where they belong, a notched gauge applied to the side will indicate any deficiency."

**CASTOR OIL TO PREVENT FOAMING.**—A correspondent of the *American Mechanic* writes as follows: "I have been troubled very much with the foaming of the water in boilers, especially when taken from creeks and pools. I have tried many ways to remedy the evil, but all the remedies that I could think of and read of failed me at times; but I have found one of late that has proven the best of all. Several months ago I was having trouble with the water, so much so that I could not run the engine. The foreman of the mill said he had used castor oil in a boiler where alkali water was used, and that he thought this would help us out of the trouble. So I put two ounces of the oil in at the check valve, and in three minutes the water was still and clear. So when foaming began again I began with the oil. Generally two ounces would last a day, but at times I would have to use a pint. My plan of banding boilers is to blow out some of the water at night or morning with about 50 pounds of steam, and put the oil in, if foaming begins after starting the engine. I never h'ow all the water out of a boiler, when hot, if I can avoid it. This boiler is tubular, 44-inch diameter, 14 feet long, and carries from 100 to 120 pounds of steam. Engine 12x20; 190 revolutions."

**A BOILER ILLUMINATED BY ELECTRICITY.**—At the late London exposition of inventions there was shown a working steam boiler, the interior of which was illuminated by electricity. The whole apparatus used for this purpose con-

sists of a little battery outside of the boiler, which is connected with incandescent lights screwed to the interior walls of the steam space above the water level and encased in steam-tight bulbs, while a second wire ends in a leading button outside of the boiler. Strong, double observing glasses are let into a brass rim set into the end wall of the boiler. If the current is closed by pressing the button against the metallic boiler wall, then the incandescent lamps begin to glow and light the interior of the boiler. It is hoped by this means of observing the process of heating water and the production and withdrawal of steam to gain material knowledge and advantages for steam.

**RESISTANCE IN TUBE PLATES OF BOILER TUBES WITH TAPER ENDS.**—In the minutes of the proceedings of the British Institution of Civil Engineers, there is an interesting record of some experiments which were made in Germany some time ago, with the object of testing the resistance of boiler tubes with taper ends forced into the tube plates. Five wrought-iron tubes were supplied for the purpose, which were forced into wrought-iron plates, bolted to and closing up the ends of a cast-iron pipe. Each tube was strengthened at both ends by a ring brazed on and turned taper on the outside, so that the outer surfaces of the two rings on each tube formed part of the same cone. The joints were made tight against an internal pressure of 15 atmospheres by means of a tube expander. In the first series of experiments the projecting ends of the tubes were not enlarged; in the second they were. The prepared test-piece was placed in the Werder machine in such a manner that at one end pressure was applied to the cast-iron pipe, at the other to the wrought-iron tube. With ends not enlarged, the mean force required to push out the tubes was 15,211.7 pounds; the maximum, 18,739.1 pounds; with enlarged ends the mean resistance was 20,943.7 pounds, showing an increase of 37 per cent. The outside diameter of the smaller end of the tubes tested was about 3.05 inches; this was measured on the taper ring. The diameter and thickness of the actual tubes themselves are not stated.

**PERFORATED IRON MASTS.**—It is curious that naval architects should have been so far at sea about perforated iron masts in ships. It appears that the English sailing-ship *Ethelstan* had a cargo of coal on board, and spontaneous combustion having taken place, all the efforts of the crew were unavailing to save her from destruction. But it surprised the master and chief mate greatly to see flames issuing from the heads of the fore and main masts when the conflagration was still confined below deck. The masts, being made of iron, were, of course, unflammable, but the apparent mystery was easily explainable. The lower masts were not only hollow, but had a number of perforations below deck for ventilating purposes. Consequently, when the cargo took fire the heated air rushed up these tubes, causing almost as thorough a draft as the chimney of a furnace, and with the air went, no doubt, a considerable volume of ignited gas. Thus, in the very endeavor to guard against spontaneous combustion by improving the ventilation of the hold, our maritime architects have created a new peril. Now, however, that their ingenuity will, no doubt, prove equal to the occasion.

**METAL LACE, ETC.**—It is not very long ago when it was proposed to make silver lace, not by working with metallic threads, but by giving pieces of ordinary lace an electro-plate bath. Since then all sorts of attempts have been made to utilize metal for clothing purposes. We have had metal hat-shapes, iron enameled collars, and even iron shirts perforated for ventilation, and so thin as to be perfectly pliable. The idea of making metal lace has been revived, but we doubt very much whether the notion will ever come to anything. Lace, to be worth wearing at all, should be hand-made. Metal lace would probably be very cheap, but to wear such a thing would be almost a sacrilege in the eyes of people who appreciate the beauties of the genuine article.

**PRECAUTIONS REGARDING THE USE OF BARBIT METAL.**—The *Age of Steel* cautions its readers against filling a box with barbit metal without first washing the box with alcohol and dusting over the surface with sal ammoniac. Whenever a tinned surface is formed, cover the remaining surface of the box with clay wash to protect it against the attack of the fused metal. To solder a joint that is to be carefully united, the surfaces must be nicely fitted with a file and then cleaned thoroughly before bringing the parts together. A piece of tin foil will occupy a small space and cover the whole surface, and when the work is heated slowly in a fire, the parts can be united so nicely that the joint will be almost invisible.

**AMERICAN "CUTENESS."**—A firm of English tool-makers, in a communication to the *English Mechanic and World of Science*, speak of what they call the "excessive cuteness for minute details" of American builders. This a contemporary regards as a very good joke, the point of which will be seen at once by a comparison between American and English machine tools. Nothing is more certain than that this same "excessive cuteness" is largely responsible for the fact that many American tools are used in England and on the continent.

## SCIENTIFIC PROGRESS.

## What We Know About Meteors.

From an exhaustive study of the very large collection of meteorites at Harvard college, the conclusion has been arrived at that many of the masses of meteoric iron now known are cleavage crystals, broken off, probably, by the impact of the mass against the atmosphere. It is found that these masses show cleavages parallel to the planes of all the three fundamental forms of the isometric or regular system; the Widmanstätten figures and Neumann lines are sections of planes of crystalline growth parallel to the same three fundamental forms of the isometric system, and, on different sections of meteorites, Widmanstätten figures and Neumann lines can be exhibited in every degree, with no break where a natural line of division can be drawn. The features of the Widmanstätten figures are due to the elimination of incompatible material during the process of crystallization, and the results of this investigation confirm the theory that the process of crystallization must have been very slow. From all that appears, the theory has come to be entertained, in respect to the origin of meteorites, that some of these masses were thrown off possibly from suns among the fixed stars, and that they were slowly cooled while revolving in a zone of intense heat.

Nature has summed up what we know about meteors as follows:

1. The luminous meteor tracks are in the upper part of the earth's atmosphere. Few, if any, appear at a height greater than 100 miles and few are seen below a height 30 miles from the earth's surface, except in rare cases where stones and irons fall to the ground. All these meteor tracks are caused by bodies which come into the air from without.

2. The velocities of the meteors in the air are comparable with that of the earth in its orbit about the sun. It is not easy to determine the exact values of these velocities, yet they may be roughly stated as from 50 to 250 times the velocity of sound in the air, or of a cannon-ball.

3. It is a necessary consequence of these velocities that the meteors move about the sun, and not about the earth as the controlling body.

4. There are four comets related to four periodic star showers that come on the dates April 27th, August 10th, November 14th and November 27th. The meteoroids which have given us any of these star showers constitute a group, each individual of which moves in a path which is like that of the corresponding comet. The bodies are, however, now too far from one another to influence appreciably each other's motions.

5. The ordinary shooting stars in their appearance and phenomena do not differ essentially from the individuals in star showers.

6. The meteorites of different falls differ from one another in their chemical composition, in their mineral forms, and in their tenacity. Yet through all these differences they have peculiar common properties which distinguish them entirely from all terrestrial rocks.

7. The most delicate researches have failed to detect any trace of organic life in meteorites. These propositions have practically universal acceptance among scientific men.

**CURIOSITIES OF MAGNETISM.**—Most well-informed people are doubtless aware, remarks a contemporary, that the globe on which they live is a great ball of magnetism, but comparatively few have an adequate idea of the influence this property is continually exerting on all sides; that many common but inexplicable phenomena can be traced directly to this source. Statistics go to show that in the matter of steel rails, as many as 13 will become crystallized and break where they go to make up a railroad track running east and west, before one of those on a north and south track is similarly affected. This is entirely due to the magnetism generated by friction, and the fact that the polarity of the magnetic current is in the former instance resisted in the headlong rush of the train, whereas in the latter case it is undisturbed. Another strange effect of this peculiar and occult force is that exerted on the watches of trainmen. A timepiece carried by the conductor or running a train 20 miles an hour, however accurate it may be, will, if the speed of the train is increased to say 50 miles, become useless until regulated. The magnetism generated by the flight of a train may be said to be in proportion to the speed with which it is propelled, and the delicate parts of a watch, numbering all the way from 400 to 1000 pieces, and peculiarly susceptible to this influence by reason of the hammering and polishing they have received, are not slow to feel the effect.—*Boston Jour. of Com.*

**CLIFF DWELLINGS IN MOROCCO.**—Recent discoveries have shown that cliff dwellings are found in great numbers in Morocco, which are now, and probably have been, inhabited from the time of their first construction. These dwellings in all particulars are like those found in Arizona and New Mexico on this continent. A New York paper speaks of them as follows: "It was not until last year that the Moore would permit any examination of the cliff dwellings which have long been known to exist some days' journey southwest of the City of Morocco.

The strange city of the cave-dwellers is almost exactly like some of those in New Mexico and other Territories which archaeologists have explored. The dwellings were dug out of the solid rock, and many of them are over 200 feet above the bottom of the valley. The face of the cliff is in places perpendicular, and it is believed that the troglodytes could have reached their dwellings only with the aid of rope-ladders. Some of the dwellings contain three rooms, the largest of which is about 17 feet by 9 feet, and the walls of the larger rooms are generally pierced by windows. Nothing is known as to who these cave-dwellers are.

**IN THE FAR-OFF FUTURE.**—Will the loss of speed in planets and comets cause them eventually to come to a stop? *Nature* asks: "Is the motion of planetary bodies perpetual? At first everything seems to show that it is. The earth, which, with its mass of three thousand trillion tons, turns with a speed which enables a student to go hare-headed a good many miles without catching cold in the act of saluting a professor, for a long time defied all attempts to detect in it loss of speed, but with the friction of the tides continually at work such loss must take place, and now it is pretty certain from the calculations of Adams, the astronomer, that the earth loses about an hour in 17,000 years, and is coming to rest rather leisurely. So, also, the hurrying up of the comets as they go round the sun is possibly accounted for by a retarding action in space which makes it necessary for them to try and make up, as it were, for lost time; and, in fact, the general arguments in the present day are in favor of what Sir Isaac Newton believed—that the motions of all bodies in space are suffering retardation, and that their velocity is becoming less and will ultimately cease."

**THEORY AND PRACTICE.**—If the theory of the "theoretical" man is a true theory, and if the practice of the "practical" man is correct practice, then the theory and the practice will fit each other line for line and dot for dot. The practical man becomes a theoretical man when he begins to give his reasons for doing as he does. If a man learns those laws of nature which relate to mechanics from hooks or lectures and then applies these laws to practice and makes no mistake in their application, he comes squarely face to face with the man who begins at the "practical" end and works up till he learns the same laws. They start at opposite ends of the same path, but both "get there all the same."—*Ex.*

**DELICATE INSTRUMENTS.**—In a very sensitive micro-radiometer described by Prof. Webber to the Helvetic Society of Sciences, the expansion of a tube of air presses a solution of zinc-sulphate toward the opposite side of a Wheatstone bridge, giving a great difference of electrical resistance. The radiation of the moon oscillates the galvanometer needle about five divisions. The microphone, another very delicate instrument, for magnifying sounds, has been so delicately constructed that the otherwise imperceptible noise made by drawing a hair across some part of it resembles the harsh grating of a saw, and the footsteps of a fly may be distinctly heard.

**A LIGHTNING-PROOF CHIMNEY.**—Lightning often plays sad havoc with tall structures in Germany. In order to avoid such accidents, a chimney has recently been constructed in Breslau, Germany, entirely of solid blocks of copper firmly compressed together, the blocks being placed carefully one on the top of the other and joined together with a special cement. The chimney is non-inflammable, and, by the nature of the material, quite secure from lightning.

**THE FINEST FIBERS.**—The nettle is among the substances which science has put to use during the past few years. This weed is even being cultivated in Germany, its fiber having proved valuable for a variety of textile fabrics. In Dresden a thread is produced from it so fine that a length of 60 miles weighs only 2½ pounds. The pineapple produces a still finer fiber, a shawl made of which, owned by Queen Victoria, cost 1000 guineas.

**FROZEN MILK.**—When milk is slowly and partially frozen the ice takes up the greater part of the cream; the unfrozen remainder contains the casein, milk, sugar, and salts, but, in consequence of its loss of cream, appears like diluted milk, and would be described as such if merely tested by the ordinary lactometric instrument. Milk which has been frozen should therefore be well thawed and shaken up, and not sold while any ice is visible.

**RULE FOR ESTIMATING THE FORCE EXERTED BY A SPIRAL SPRING.**—One of the rules for spiral springs, when made of round steel, is to multiply the cube of the diameter of the steel wire in inches by the amount that it is to be deflected for each coil, and this product by 75,000, then divide by the diameter of the spring, measuring from the center of the wire, and the quotient will be the force exerted in pounds.

**THE BLUE OF THE SKY.**—Prof. Tyndall has decided that the sky is blue but the blue is not pure. He says: "On looking at the sky through a spectroscopic we observe all the colors of the spectrum; blue is merely the predominant color."



# GOOD HEALTH.

## Snow-blindness and "Boot-leg Goggles."

EDITORS PRESS:—Snow-blindness is an affliction which results from the rays of the sun being reflected from a surface of snow into the eyes. It is not only painful; it frequently results in permanent injury. The eyes continue sensitive to exposure, and the tendency to close them when looking at bright objects indicates the serious nature of snow-blindness. My experience may prove serviceable if it saves others from this misfortune, and I will briefly state the facts. While living on my ranch in Colorado one of my cows was found in an irritating ditch, where the ditch had been cut through a ridge. This cut was partly filled with drifted snow. The storm was over, and as it was in March the sun was shining brightly. To enable this cow to get out it was necessary to shovel a path in to her and also toward the sun. The plan succeeded, and the cow was liberated, but that night my eyes felt as if red pepper had been rubbed on them. If I closed them the tears would pour out and wet my cheeks. I was so blind that I could scarcely recognize my animals by daylight; ordinary exposure to sunlight was very painful.

This state of affairs compelled me to study out a remedy. After trying several expedients to shut out the light, I adopted another plan. I cut from a boot-leg a piece of leather having two ovals to fit each eye, leaving a strip to connect them and rest on the nose. The leather was soaked in water, and then each eye-piece was hammered into an iron spoon, making them convex. When they were dry a narrow slit was cut lengthwise in each of these rounded eye-pieces, and a buckskin thong fastened at each end to allow the whole to pass over the head. This contrivance cut off the reflected rays and enabled me to look out freely when the strongest sunlight was reflected from a field of snow. The goggles fitted close without inconvenience to the eyes, and could be placed in the pocket if desired.

Afterward I saved a member of a surveying party from snow-blindness by giving him a pair of boot-leg goggles, and enabled him to go on with his work. The greatest danger from this cause is in the spring, when the sun's rays have gained intensity. As some of your readers may be interested, and most American boys can make the goggles, my experience may possibly result in their benefit.

EDWARD E. CHEVER.

San Francisco, March 1, 1888.

## How to Treat the Eye With a Cinder in It.

R. W. St. Clair writes the *Medical Summary* as follows: "Nine persons out of ten with a cinder or any foreign substance in the eye will instantly begin to rub the eye with one hand, while hunting for their handkerchief with the other. They may, and sometimes do, remove the offending cinder; but more frequently they rub until the eye becomes inflamed, hind a handkerchief around the head, and go to bed. This is all wrong. The better way is not to rub the eye with the cinder in at all, but rub the other eye as vigorously as you like.

"A few years since I was riding on an engine. The engineer threw open the front window, and I caught a cinder that gave me the most excruciating pain. I began to rub the eye with both hands. 'Let your eye alone, and rub the other eye' (this from the engineer). 'I know you doctors think you know it all; but if you will let that eye alone and rub the other one, the cinder will be out in two minutes,' persisted the engineer. I began to rub the other eye, and soon I felt the cinder down near the inner canthus, and made ready to take it out. 'Let it alone, and keep at the well eye,' shouted the doctor pro tem. I did so for a minute longer, and, looking in a small glass he gave me, I found the offender on my cheek. Since then I have tried it many times, and have advised many others, and I have never known it to fail in one instance (unless it was as sharp as a piece of steel, or something that cut into the ball, and required an operation to remove it). Why it is so, I do not know; but that it is so, I do know, and that one may be saved much suffering if he will let the injured eye alone and rub the well eye."

LABOR AND RECREATION.—Recreation is intended to the mind as whetting is to the scythe, to sharpen the edge of it, which otherwise would grow old and blunt. He, therefore, that spends his whole time in recreation is ever whetting, never mowing. His grass may grow and his steel starve; as, contrarily, he that always toils and never recreates is ever mowing, never whetting, laboring much to little purpose. As good no scythe as no edge. Then only doth the work go forward when the scythe is so seasonably and moderately whetted that it may cut and so cut that it may have the help of sharpening.

BEEFSTEAK WORTHLESS FOR A BLACK EYE.—There is a world-wide superstition, says the *Chicago Journal*, that as soon as a man gets a black eye he must use cold applications for hours, and that the best cold application possible is raw beef. I call it a superstition because it is without reason and against reason. Everybody knows that what makes a discoloration

of the skin by a bruise is the congestion of the part with the blood that cannot get away again, so that it decomposes and changes its color; and everybody ought to know that the way to prevent such a result is to facilitate and stimulate the circulation in the bruised part. A cold application retards the circulation, and the best thing to stimulate it is hot applications. Twice in my life I was threatened with a black eye. On the first occasion I applied raw beef and other cold applications and succeeded in producing the blackest eye I ever saw. On the second occasion I got some hot water right away and bathed the eye for about half an hour in it. The result was that there was not the slightest discoloration visible at any time. These hints are well worth pasting in the hats of some people in Chicago.

THE CLOSE OF LIFE.—It is a great mistake to suppose that the usefulness of life ceases with the power of active service. When the tired hands are folded in the repose which their toil has rightly earned for them, when the weary brain is relieved from the burden of cares and perplexities which it has nobly borne, there should be a season rich in blessings and in influence which no one would willingly forego. Then should come the leisure vainly longed for in past years, and the opportunity to attend to many things and to enjoy much that was before impossible. If the busy life has also been an honorable one, there are sweet memories, cherished friendships, the devotion of children, the respect of society, the power of helping others through the accumulated experience and intelligence of many years. The very presence of a venerable and beloved face is a blessing to those who look upon it, bringing suggestions of well-earned peace and calm to the busy toiler, and calling up emotions of tender reverence in the eager and buoyant youth.

CATARH AND HAY FEVER.—The microscope has proved that these diseases are due to the presence of living parasites in the lining membrane of the upper air passages and eustachian tubes. The eminent scientists, Tyndall, Huxley and Beale, indorse this, and these authorities cannot be disputed. The regular method of treating these diseases has been to apply an irritant remedy weekly and even daily, thus keeping the delicate membrane in a constant state of irritation, allowing it no chance to heal, and as a natural consequence, very few permanent cures are recorded. In any treatment of these diseases, the treatment, if in any way caustic, applications should be made at infrequent intervals, so that the membranes may have a chance to recover from any violence that may have been used in the previous application.

## USEFUL INFORMATION.

SUBSTITUTES FOR TURPENTINE AND BOILER OIL.—Among recent coal-tar products is an article made by an English firm, S. Banner & Co., of Liverpool, from a combination of hydrocarbons having a similar composition to that of ordinary turpentine. As it has been found to act quite as well as, and is much less costly than, turpentine, it will no doubt be very valuable in the arts and manufactures. It is already, we understand, being largely used in this country and abroad, its excellence being such that it is quite impossible to distinguish the work done by it from that produced by ordinary turpentine even in carriage painting and varnishing. Another new product of interest to the paint trade is boiled oil, which is composed partly of hydrocarbons. It is similar in odor and appearance to boiled linseed oil, and differs from most other oils intended to replace linseed oil in two important characteristics, viz., that it will dry perfectly in a comparatively short time and leave the face of the paint as smooth and hard as enamel.

THE USE OF A GOOD MATERIAL THE BEST ECONOMY.—That economy lies in the use of a good material, and not in cheap stuff, says the *Master Mechanic*, was well illustrated on one of the large Ohio roads recently. The newly appointed superintendent of motive-power found that the valve oil used on the road was a mixture of black oil and tallow, the total cost of which was 32 cents per gallon, and that the average mileage per quart was 100 miles. He also found that one valve seat was being faced every day in the shops. A change was made to valve oil costing 50 cents per gallon. This is giving an average mileage of over 200 miles per quart, and it has been necessary to face only five valve seats in four months.

ZINC AS A FIRE EXTINGUISHER.—Zinc, placed upon the fire in stove or grate, is said to have proved itself an effective extinguisher of chimney fires. To a member of the Boston Fire Department is reported to be due the credit of successfully introducing this simple scheme. When a fire starts inside a chimney, from whatever cause, a piece of thin sheet zinc, about four inches square, is merely put into the stove or grate connecting with the chimney. The zinc fuses and liberates acidulous fumes, which, passing up the flue, are said to almost instantly put out whatever fire may be there. It certainly sounds simple enough.

AN ABSOLUTE NON-CONDUCTOR.—A correspondent of the *Globe-Democrat* says: A absolute non-conductor, insensible alike to heat or cold and absolutely fire-proof, has at last been discovered in pulverized paper. I tried this discovery last winter by packing the drain and water pipe of my residence with it, and all the pipes are on the outside of the building, and the season was the severest of many years. My plumbing did not cost me 25 cents. As a covering for steam pipes, it acts equally as well. Pulverized paper, I repeat, is an absolute non-conductor.

THE SECRET OF PAINTING CHINA WARE.—Jonny June, in the *American Magazine* for February, says that the present manufacture of porcelain is a comparatively recent industry, and is constantly reaching fresh results. The underglaze treatment of china, for example, was not known here 25 years ago; it was a secret guarded most carefully, and confined to a few European and Eastern factories and workers. It was a girl who discovered it—Miss McLaughlin—and now it has become the property of all expert china decorators. Her success was not alone important to china-painting as an art; it was specially valuable in raising the estimate put upon the work of her own sex, and has perhaps done more than ought else to stimulate to good results the work of women in this branch of industrial art.

AFRICAN TEAKWOOD INDESTRUCTIBLE.—The interesting fact has been stated that so indestructible by wear or decay is the African teakwood that vessels built of it have lasted 100 years, to be then only broken up on account of their poor sailing qualities from faulty models. The wood, in fact, is one of the most remarkable known on account of its very great weight, hardness and durability, its weight varying from 42 to 52 pounds per cubic foot. It works easily, but on account of the large quantity of silex contained in it the tools employed are quickly worn away. It also contains an oil which prevents spikes and other iron work with which it may come in contact from rusting.

POTATO FLOUR.—Potato flour is extensively manufactured in Germany. It is used by sausage-makers, bakers, confectioners and cooks for powdering purposes. Weaving establishments use it to give their goods a glossy appearance and to size the threads in the wool. It is also used in the manufacture of starch, potato sugar and white syrup. In France drying potatoes is quite an industry. The potatoes are pared, sliced, and placed in brins for a short time, then placed in a drying-room of 200 degrees until dried. This farina is used in several manufacturing processes.

THE SAND-BLAST FOR CLEANING WALLS, ETC. Amateurs adopt new ways and improved methods more readily than your skilled workman. As occasion offers, let amateurs try this sand blast for cleaning old stained and dingy stone walls or buildings instead of using wire brushes. Also for cleaning rust from iron and eand from castings without scraping. Possibly the sand-blast may answer for cleaning floors, stairs, interior walls, ceilings, etc., without washing or scrubbing. No patent on these adaptations of this sand-blast.

TO RENOVATE PICTURE FRAMES.—To renovate and brighten the gilt frames of pictures and mirrors that have become dirty and dingy, simply wash very gently with a small sponge moistened with spirits of wine or oil of turpentine, the sponge only to be sufficiently wet to take off the dirt and fly-marks. The frames should not be wiped afterward, but left to dry of themselves.

TO PREVENT MOISTURE IN SALT.—To prevent salt from becoming moist and caking so as not to sift freely from the cellars, a house-keeper recommends the use of a little cornstarch with the salt; a saltspoonful of cornstarch to about two salt-cellars of salt. The starch absorbs the dampness and the salt sifts more easily.

TO REMOVE GREASE.—Aqua ammonia, two ounces; soft water, one quart; saltpeter, one teaspoonful; shaving-soap in shavings, one ounce; mix all together; dissolve the soap well, and any grease or dirt that cannot be removed with this preparation is a hopeless case.

A HINT FOR THE COOK.—To test cake in the oven never insert a broom splinter, but draw it gently forward and put the ear close to the loaf; if it he not done there will be a little sputtering sound. When it is thoroughly baked there will be no sound.

TARNISHING SILVER.—Nothing tarnishes silver more quickly than rubber, the ring around the neck of a fruit-jar being enough to color a whole closetful of silver in one night. A lump of gum camphor in a closet will do much to protect the goods.

LEAD CASTING.—Pure lead does not run smooth in any casting with any kind of mold. But if it is alloyed with tin and bismuth, it will run quite smooth and melt at a much lower temperature.

NON FLAMMABLE TISSUES.—The lightest tissues can be rendered unflammable by dipping them in a solution of phosphate of ammonia in water. It will be found impossible to set the fabric so treated on fire.

## Mexican Mines.

An official report on the mines of Vera Cruz states that coal deposits are found in a parallel line of equal length (150 miles) running through the western canyons at a level of 2000 to 4000 feet above the sea. The existing roads are inadequate to the development of these coal-fields. The coal is found near the surface, and the lower seams could be easily worked.

The coal and petroleum mines in the State of Vera Cruz, so far as extent is concerned, are the most important as yet discovered.

The Wells-Fargo Express Co. exported from Mexico, in December last, silver hulsion, coined silver and gold valued at \$764,564. In January the hulsion and coin exported by the company was valued at \$588,014.

The private commercial agency of Mexico in London reports to the Government that the following companies have been organized in the United Kingdom during the year 1887 to work gold, silver and copper mines in Mexico:

	Capital.
Bytopias Mining Company	£40,000
Bravo Mine Syndicate	15,000
El Gale mines	20,000
La Luz mines	210,000
London Mexican Prospecting and Finance Co.	25,000
Mansfield Mexican silver mine	100,000
Mexican copper mine	250,000
Mexican Santa Barbara	300,000
Oaxaca Mining Co.	100,000
San Acacio Mining and Freehold State Co.	400,000
Shedding Co. of Mexico	100,000
South Mexican Gold and Silver Mines Co.	180,000
Westminster Catorce Syndicate	2,800
Zacatecas Gold Mine Co.	10,000

Total ..... £2,135,500

According to a recent official report, Mexico's output of gold and silver for the past ten years is summed up as follows:

Years.	Gold.	SP. per.	Total.
1877-78	\$747,000	\$24,837,000	\$22,684,000
1878-79	831,000	25,125,000	26,666,000
1879-80	912,000	26,809,000	27,742,000
1880-81	1,013,000	28,234,000	29,247,000
1881-82	937,000	29,300,000	30,236,000
1882-83	950,000	29,569,000	30,525,000
1883-84	1,055,000	31,605,000	32,760,000
1884-85	914,000	33,226,000	34,140,000
1885-86	1,026,000	34,112,000	35,138,000
1886-87	1,047,000	34,600,000	35,647,000

Totals ..... \$5,518,000 \$208,627,000 \$208,645,000

During the last fiscal year \$410,000 in gold and \$25,600,000 in silver were coined in the Mexican Republic, and \$8,045,749 in gold, \$323,883,608 in silver and \$203,296 in copper in the last 14 years.

## Product of Comstock Mines.

The statement of the assessor of Storey county, Nev., showing the ore and hulsion production of the mines of the Comstock lode for the quarter ended December 31, 1887, and just filed, contains some interesting figures relating to the cost of mining and milling in that district. We extract the following items:

Consolidated California and Virginia produced 38,940 tons of ore, which yielded hulsion valued at \$739,661.83; cost of extraction, \$276,898.58; transportation and reduction, \$272,580.50; total cost, \$549,478.58; net yield, \$190,183.30; average yield per ton, \$19.

Hale and Norcross produced 1594 tons of ore, the total hulsion product from which was \$45,666.33; cost of extraction, \$18,726.83; transportation and reduction, \$8818.56; total cost, \$27,546.39; net yield, \$18,120.94; average yield per ton, \$28.59.

Savage produced 5445 tons of ore, the gross hulsion yield of which was \$113,404.45; cost of extraction, \$62,579.18; transportation and reduction, \$40,460; total cost, \$102,039.18; net yield, \$10,365.24; average yield per ton, \$20.83.

Chollar produced 1700 tons of ore, which yielded hulsion valued at \$27,144.87; cost of extraction, \$29,857.38; transportation and reduction, \$11,900; total cost, \$41,757.37; excess of cost of production above yield, \$14,632.50; hulsion yield per ton, \$15.97.

Yellow Jacket produced 24 828 tons of ore, which yielded hulsion valued at \$196,441.64; cost of extraction, \$121,922.56; transportation and reduction, \$186,220; total cost, \$308,143.27; excess of cost of production above yield, \$111,701.63; average hulsion yield per ton, \$7.91.

Kentuck produced 1656 tons of ore, which yielded hulsion valued at \$23,190.65; cost of extraction, \$13,683.70; transportation and reduction, \$10,104.60; total cost, \$23,788.30; excess of cost of production above hulsion yield, \$597.65; average hulsion yield per ton, \$14.

The total product of the lode for the quarter is \$1,145,509, against \$584,614 for the quarter ending September 30, 1887. It is estimated that the total yield of the lode for the current quarter ending March 31st will exceed \$2,000,000.

VERDICT FOR THE MINER.—A jury in Judge Levy's court has rendered a verdict of \$1000 for the plaintiff in the case of John Smith against the Black Diamond Mining Co. of Contra Costa county. The suit was brought by Smith to recover \$10,000 damages for injuries received while at work in the mine.

The Quinn, Sutro, Niagara, Liverpool, North Comstock, Succor, Mohabao and Contenton Mining Companies have been stricken from the list of the San Francisco Stock Exchange for the non-payment of the annual dues.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**PLYMOUTH.**—Cor. Amador Ledger, March 10: A descent was made into the Pacific mine on Friday last, and the part of the mine that had been burning was thought to be free from fire, and much satisfaction was expressed at the condition of the mine, but unfortunately in a short time after the examination had been made the fire broke out in a new place, and the smoke drove the men out of the mine. The shaft is covered over again, and we hear that the managers are waiting for orders from headquarters as to what will be the next move. We hear a great deal of talk about flooding the mine with water, and that the preliminary steps have been taken to conduct the water to the mouth of the shaft. It is rumored that the owners of the mine will be on the ground shortly, when some heroic efforts will be inaugurated to put out the fire. It is reported that a ledge of quartz has been struck in the New London mine, 14 feet wide, and of high grade. The New Chicago has started sinking again, and will sink another 100 feet. The ore from the mine shows considerable free gold, and is well filled with sulphurets. The War Eagle Co. is cleaning up. We hear that the owners are well satisfied with the results. Mr. Edlog is still crosscutting in his claim. He finds some very nice-looking quartz that is full of sulphurets and prospects pretty well in free gold when worked in a mortar. Bowden is still blasting his way toward the ledge in his claim. The tunnel is in over 400 feet.

**AMADOR CITY.**—Cor. Amador Ledger, March 10: The mines and mills are all running steadily. At the Bunker Hill mill they now have 16 of the Frue concentrators, 12 of which are in good working order, and the other four will be ready in a few days. If the report is correct they are taking out some very rich rock from the tunnel near the mill. Sinking was commenced at the Keystone north shaft last week, but was stopped again after three days' work. The superintendent went down to the city for a few days, and on his return operations in the shaft ceased. A slight change has been made at this mine in regard to the miners coming to the surface to eat their dinner. They now have to eat their dinner in the mine, so that they are under ground from seven in the morning till six at night. The air compressor at the South Spring Hill mill has been moved to the planing-mill, where it will be placed by the side of another one of the same size. The pipes that convey the air to the mine are about all laid, and they expect to have the compressors running some time next week. The water in the Talisman shaft is below the 500-foot level. There are several men at work repairing the shaft and the 400-foot station.

**SUTTER CREEK.**—Cor. Amador Ledger, March 10: Nearly all of the victims of the late fire are already at work rebuilding. Hammer and saw can be heard almost all over the business part of Main street. Our mines are all looking well and running regularly. At the Wildman mine they are preparing for the additional ten stamps, and Knight & Co. are busy getting out the mortars and other castings. In a month or six weeks they are in hopes of having the stamps in operation. The four men who have leased the Lincoln mine are running 20 stamps. The rock that is being taken out is of good quality, and the mill is looking well. There are good prospects of the Mahoney mine starting in good shape in the spring.

**DRYTOWN.**—Considerable prospecting has been done on the mineral belt between the Gover mine and Plymouth. A new claim known as the Minnie Moore mine, situated about three-quarters of a mile northwest of the Cosmopolitan, and one mile south of the New London, is being worked by Messrs. J. Mayden, John Bulowski, and Robert Waddell, who have sunk a shaft about 25 feet. A three-foot ledge was struck, showing a flattering prospect. The Gover is running a full force of men, and everything about the mine looks encouraging. Raymond Brees succeeds Mr. Waters as foreman of the Gover mill.

#### El Dorado.

**GOLD DUST.**—Georgetown Gazette, March 10: Our miners are busy and the sale of gold dust in town is increasing.

**JOSEPHINE.**—Every one who has visited the Josephine mine since the 20-stamp mill was completed says it is the best equipped mine on the divide. This mine had been idle for several years before the present company took hold of it, but under the present management it has proved to be a very valuable property. There are other mines here on which failures have been made that will prove equally valuable when they fall into the right hands.

#### Napa.

**QUICKSILVER SHIPMENTS.**—Calistogan, March 10: During February, quicksilver from the mines here mentioned was shipped from Calistoga to San Francisco as follows: Great Western (flasks), 64; Bradford, 187; Sulphur Bank, 135; Napa Con., 273; total flasks, 659, or 49,932 pounds, which amount is very good for a short month.

#### Nevada.

**NORTH BLOOMFIELD.**—Nevada Herald, March 7: Two or three weeks ago matters looked very blue at North Bloomfield. The croakers thought the town was gone in, and people commenced to cast their eyes around for a good place to emigrate to. The shutting down of the Derbec seemed to be the last feather to break the camel's back. But things have suddenly changed. The Derbec is at work full-handed and other mines there will work. There is the richest gravel belt in the State surrounding North Bloomfield and much of it will pay to drift. It will be drifted and Bloomfield will be a good town after many of its residents have gone to the happy hunting-grounds.

**STRUCK IT RICH.**—Grass Valley Union, March 10: Cunningham & Co., who have been having good pay gravel in their claim near Randolph Flat for some time past, have found it quite rich within the last few days in extending their drift. One pan of dirt yielded \$11.25, the largest piece in this yield being about the value of \$3. A number of other panfuls yielded almost as much per pan. The finding of such rich gravel will prove a great stimulus to other prospecting operations going on in the vicinity on the same lead. Among the prominent locations on the ridge are the Holbrook & Harrington claim and the Baltic claim, both on the same channel.

**THE DELHI LOOMS UP.**—North San Juao Times, March 10: From and including February 1st to March 1st the cleanups at the Delhi mine aggregated, in gold bullion, the sum of \$32,700, from which the 13th dividend of \$10,000 was declared and paid on the 1st inst. The receipts at the mine for the latter day's work were \$12,500. If there is an 18-stamp mill on a mine in this State that can make a better or as good a showing, we want to hear from it. The Delhi has now paid 13 dividends of \$10,000 each. It has paid \$130,000 to its stockholders within the past 13 months, and from the looks of the rock in sight, better results may be anticipated for the year commencing on the 1st inst.

**A RICH MINE.**—Mr. Philbrick, one of the owners of the junction mine, situated at the junction of the North and Middle Yuba rivers, a few miles from North San Juan, informed us that a piece of rock taken from the said mine 30 feet below the surface was sent with some sulphurets to the Delhi mine to be assayed, with the following results: The rock assayed over \$650 to the ton; ore assay of sulphurets showed over \$1100 to the ton, and a second assay of sulphurets showed over \$1700 to the ton. The ledge below the water is over 15 feet in width, though the streak of rock which assays so enormously is not a foot in width. This ledge is owned by G. N. L. Powell, Fred Philbrick and Frank N. Morris.

**THE GRANT MINE.**—The stamps in the General Grant mine are still quiet. Just when they will start the mill to crushing has not yet been made known. That they have good-paying rock, there can be no doubt.

#### Placer.

**SPRING GARDEN.**—Placer Herald, March 10: Spring Garden and vicinity has always been an inviting field to the miner. The ravines were all rich, and in many places the hillsides have paid the prospector well for his labor. The backbone of the Divide separates Spring Garden from the well-known Owl creek and its tributaries, from which thousands of dollars were taken in the early days of mining. A deal of prospecting has been done in the Spring Garden ranch, but for some reason or other the gold-hunters failed to strike the channel. But though unsuccessful, their failure never weakened their faith in its existence. Many miners on the Divide still believe that the big "blue" lead is there, or near there, and that wealth awaits the man or the company that shall be so fortunate as to find it. All the indications strengthen this belief. Slopes have been sunk, and tunnels have been run, but the prospectors, so far, have not had the money to back their faith. The latest attempt is that of the Gray Eagle company, which is now sinking a shaft, half a mile above the ranch, on the top of the ridge. This shaft is down 220 feet in gravel and boulders. This depth indicates a channel, and if the quantity of water is not too great, the company will go down to bedrock and run drifts in various directions to test the depth and breadth of the deposit. This shaft is an experiment, and much depends upon the result. Should the experiment be successful, other companies will begin operations at once. The Gray Eagle company is doing the pioneer work, and is risking its capital in its attempt to develop this section. Should it not succeed, the further development of the mines would be arrested for years, capital would seek other fields and the existence of the channel would remain unproved.

**LIVE OAK.**—George Geissendorfer is opening up the old Live Oak quartz mine. He has sunk about 70 feet, and is very well satisfied with the indications. The ledge is 4 feet wide, and the rock, according to mining experts, is of the same kind as that in the Idaho mine, at Grass Valley. As soon as the roads are in condition he will haul several tons to mill. From samples we have seen, the rock will pay \$20 a ton, easy.

#### Plumas.

**LIGHT'S CANYON.**—Cor. Lassen Mail, March 10: The Engle Bros. in Light's canyon have a very large copper ledge, which, considering the market rates of copper, should attract the attention of capitalists. The ledge is about 50 feet wide, and is said to abound in profitable ore. The Crescent mine is still operating, and it affords employment for about 40 men. The Green Mountain is yet idle, and the indications are that it will be for an indefinite period. The Indian Valley mine near Greenville is not operating at present, for want of water for motive-power.

#### San Bernardino.

**HERCULES COPPER MINE.**—Colton Semi-Tropic, March 7: A few days since P. C. Garvey and W. McCombie of San Bernardino sold to a San Francisco firm the Hercules copper mine, located eight miles north of Goff station, which is about 200 miles east of this city, on the A. & P. road, and in San Bernardino county. The price is not stated, but it is understood that Garvey & McCombie got a round sum of money for the property. The ledge of the Hercules is from six to eight feet wide and carries ore that will work 33 per cent in copper. There was between 500 and 600 tons of ore on the dump when the mine was sold.

#### Shasta.

**LOWER SPRING MINES.**—Cor. Redding Free Press, March 10: Everything in the line of industry at Lower Springs is dormant, perhaps on account of the late storm and possibly from want of capital. The Miller mine has closed down, but will probably commence again soon. White of the Whiteoak mine has some fine specimens of ore. Penrose of the Eastern Star has commenced operations. Emery has struck some very rich ore in the extension to the Eastern Star. There are about 20 gold-bearing ledges in this belt running an easterly and westerly course. The mines are all poor and are waiting for capital to develop the value of mining property in this district.

#### Sierra.

**BALD.**—Mountain Messenger, March 10: The Bald Mountain Ex. Co. declared a dividend, No. 16, March 16th, of five cents a share, aggregating \$3000. A large crew of men are working and matters are prospering at the mine. The payroll for February was \$5132.25.

**ALLEGHANY.**—Cap. Bradbury came over from Alleghany, Wednesday and showed us an ounce of gold, the prospect obtained from the bedrock on the east rim of the deep channel at the bottom of the in-

cine of the California Co., on what is better known as the Typhoon and Nebraska ground. This is beyond a reasonable doubt the lava-capped lead extending from the Ruby, through the Extension and South Fork to the California. This insures a prosperous future for Alleghany.

**GOLD BLUFF.**—The yield of the Gold Bluff quartz ledge, owned by A. Vanslyke, near Dowoieville, for the past 32 days, was over \$9000. Only 14 men are working. This mine promises to eclipse the Young America.

#### Trinity District.

**A MINING SALE.**—Silver State, March 5: The Morning Star, West Star and California, in Trinity mining district, west of old Oreana, have been sold by J. T. Hauskins, S. R. Young and Antone Kaufmao, to Ansil Skidmore of New York, and associates. The purchase price, \$15,000, was paid here, and the deeds recorded yesterday. These mines adjoin the Evening Star mine, which in early days was worked to the water level and produced very rich ore. One of the mines is developed to a considerable extent and is considered valuable property. The purchasers will set men at work and build a mill on the property immediately.

#### Tuolumne.

**GROVELAND.**—Cor. Tuolumne Independent, March 10: Active work is going on in the celebrated Longfellow mine near Big Oak Flat. The hoisting machinery is on the ground and will soon be ready for work. If this does not prove to be a bonanza, then all signs fail. Work is still going on in the Belcher mine. The mill and engine are all ready for crushing as soon as the rock-breaker is set up. Fisk & Chrystal have put their mill, at Big Oak Flat, in good order, and will start up on rock from the Accident mine as soon as the weather will permit. John Cavanaugh is at work on the Red Jacket, taking out rock which he will crush at the Big Oak Flat steam mill. The rock prospects well and ought to pay handsomely. Winslow Hubbard has moved down to the river to resume operations on his two promising claims. Mr. Cruikshank is at the Mary Ellen mine, superintending some prospecting work, and is getting splendid prospect in his second tunnel. There is a rumor that the Mount Jefferson property will soon change hands, and the Rhode Island mine, adjoining it, is now under bond to the owner of the Mt. Jefferson, and is to be sold with it. A new shoot has been cut in tunnel No. 3 of the Kanaka mine. The shoot shows free gold and prospects well. Herbert Shaw discovered a new vein in the Equinotial mine last week, which shows lots of gold. There are now three veins in this claim, within 25 feet of each other, and as he is now sluicing off the hillside, more may be discovered when the top soil is removed.

**BONANZA.**—Sonora Democrat, March 10: Messrs. Oliver & Johnson of the Bonanza mine have a fine prospect, but the pouring in of water has stopped all manual operations and necessitated the application of a steam engine and pump. The portable engine heretofore used by Mr. Ferguson has been purchased, and it will soon be placed and in successful operation.

**HYDE.**—Mr. Hyde of the Hyde mine, ten miles above Sonora, says that the above mine is doing finely; that the lead is of good width and looks well. The mill is not running at present, owing to the rock-breaker becoming disabled. The foundry in Sonora will soon have a new one built and ready for operation.

**GRAVEL ENTERPRISE.**—Messrs. Graham & Seibert of Sonora have found some gravel in the neighborhood of the Phoenix reservoir and they are now actively engaged in preparing for systematic development. It will require considerable work before the extent of the gravel stratum can be determined, but from present appearances they have a fine prospect.

**SOULSBY.**—It is thought that the Soulsby mine will shortly commence operations. Parties who have a comprehensive knowledge of mining say that it is not near worked out and that its future will rival its past.

### NEVADA.

#### Washoe District.

**BELCHER.**—Virginia Enterprise, March 10: The 500 level east crosscut is in 123 feet, having been advanced 28 feet during the week. The ground shows considerable clay and a slight flow of water. The west crosscut is in 46 feet, having been advanced 22 feet during the week. The material in the face shows no particular change.

**HALE AND NORCROSS.**—This mine has produced \$35,000 during the month of February from ore reduced at the Vivian mill, which has only 16 stamps. Ore is now being shipped to the Mexican mill, and Monday the 20 additional stamps of the Chollar will be started on Norcross ore. It is proposed to push the milling of the ore in the future. In San Francisco the feeling is that this mine will be a dividend-payer within the next 60 days. The work in the mine the past week shows the extent of the ore body above the 700 level to be 280 feet long, so far as developed, with an average width of from 30 to 35 feet.

**GOULD AND CURRY.**—Are still extracting ore on the 250 and 300 levels, and have extracted during the week 55 tons of fair-grade milling ore, which is stored in the drifts in the mine. On the 1300 level the south drift from the east drift has been extended 48 feet; total length, 425 feet. This drift is within a few feet of the south line. When this line is reached two west crosscuts will be started. On the drain tunnel level from the main south drift near the south line have started two west crosscuts. These crosscuts are passing through the old west levels.

**BEST AND BELCHER.**—On the 425 level the main north drift has been extended 31 feet; total length, 600 feet. The formation is quartz showing value by assay. From No. 1 upraise, 70 feet above this level, the north drift has been extended 23 feet; total length, 34 feet. The formation is quartz. Opposite the north drift the south drift has been extended 20 feet; total length, 31 feet. The face of the drift is in porphyry. The upraise has been carried up 8 feet; total height, 78 feet. The top of the upraise is in quartz, showing value by assay.

**ALTA.**—Are sinking a new shaft, 250 feet east of the Keystone shaft on the Keystone vein, to meet an upraise from the 825 level. This will greatly facilitate the banding of ore and prospecting the mine at that point when completed. Now that the

freezing weather is over, work will soon again be resumed at the mill. The bins are all full of ore, and there is scarcely room left in the mine in which to stow it away.

**CHOLLAR AND POTOSI.**—Prospecting work is being vigorously pushed on the several levels of both mines above the 550 level. The ore reserves are yielding steadily, and the mill is running splendidly. Progress is reported in the several drifts, without any particular change to note. Twenty additional stamps will be started at the mill Sunday, and will run on Norcross ore.

**SAVAGE.**—During the month of February this mine produced \$80,000 from ore reduced at the Mexican mill. Shipments are now being made to the Vivian mill, and it is understood that the Rock Point mill will soon be busy reducing its ores. The week's work has been very satisfactory, and the mine could keep the largest mill on the lode running.

**HAYWOOD.**—There are 12 men engaged in the mine, 5 of whom are knocking down about 18 tons of ore per day, which is shipped and reduced at the Taylor mill. The ore comes mainly from below the tunnel level. Crosscutting for the hanging-wall 225 feet below the tunnel level is progressing fast.

**BALTIMORE.**—The developments on the 380 level are not yet sufficient to demonstrate the extent and value of the ore recently struck at that point. The machinery is working well and handles the water, though with some difficulty. It is believed that this water will give out.

**OEST.**—The Oest mine is being actively worked. The ore shipped and worked at the Briggs mill is very rich, and the owners of the mine have a veritable bonanza. The mining works are all nicely covered by a substantial building.

**CROWN POINT.**—No. 1 east crosscut is in 80 feet, having been advanced 17 feet during the week. The ground shows no material change. No. 2 east crosscut is in 123 feet. The face shows a small flow of water and considerable clay.

**UTAH.**—On the 472 level east crosscut No. 3, opposite west crosscut No. 2, has been extended 27 feet; total length, 90 feet. Have cut out a station and started an incline upraise from the end of this crosscut.

**IOWA.**—The retimbering, enlarging and track-laying on the 500 adit level has progressed favorably during the last week. Work will be resumed in the face of the tunnel by the 12th of the month.

**YELLOW JACKET.**—Shipping 125 tons daily to the Brunswick. It is extracted from the 1200, 1300 and 1400 levels. The machinery is all working well.

**ALPHA, IMPERIAL AND EXCHEQUER.**—Progress only is reported from the drift on the 300. There is no change of interest in the formation.

**JUSTICE.**—Work is progressing favorably and the extraction of ore continues, there now being about 1600 tons on the dump.

**SEGREGATED BELCHER.**—The south drift from the raise is now in 214 feet, having been advanced 20 feet during the week.

**BULLION.**—Are cleaning out drifts on the 500 level. The east drift has been cleaned 150 feet and the west drift 20 feet.

#### Arabia District.

**TO SHIP ORE.**—Cor. Silver State, March 10: The unrequitable, indefatigable "never-say-die," go-ahead Lovelock has conceived the plan in order to utilize the refractory ores of Arabia district, to ship them as ballast to Liverpool, thence to Swansea, for reduction. The ships now paying \$1 per ton for ballast would gladly avail themselves of this arrangement, and all hands concerned be benefited, while additional employment would be generated in this neighborhood. Let the good work go on, the more the merrier. Cottonwood is not to be forgotten in this connection; its valuable deposits of cobalt are sought for by several parties anxious to take hold, and Mr. Lovelock is busy negotiating so as to have things moving as soon as possible.

#### Candelaria District.

**BISMARCK MINE.**—Esmeralda News, March 10: A. L. Woodcock, Geo. Wilson and G. W. Koster of Candelaria have leased their Bismarck mine to the Bismarck Mining Co., a California incorporation. The lease runs for one year; the company is to pay the owners ten per cent of the gross yield of the mine. There is also a proviso in the lease to the effect that if the company fail to prosecute the work for a period of 60 days, such failure shall be deemed an abandonment and forfeiture of the lease. The Bismarck has long been considered a valuable property. It adjoins the Potosi and is in the middle of the great mineral belt of Columbus mining district, which has produced millions of the nation's wealth.

#### Cherry Creek District.

**FAVORABLE.**—Fioche Record, March 7: Very favorable reports reach us of the mining prospects of Cherry for the coming season. The Exchequer people have a body of good ore in the mine, under the water-level, and the mine promises to be a permanent property. At the Star, Chas. W. Keeney, who is in charge, and knows the mining lay of the country better than any man living, is very reticent, but parties who are in a position to know, tell us he has uncovered a fine body of rich ore in the upper levels of the Star. Cherry will boom some next summer.

#### Eureka District.

**MARKET LEAD.**—Eureka Sentinel, March 10: The Eureka Con. Mining Co. shipped yesterday by railroad 100 tons of market lead. It has the Peacock blue cast, which denotes a high state of purity. This lead assays only 35 cents per ton in silver, but that amount is above the late average, which goes to show that L. W. Davis is quite successful in refining by the zinc process.

**IMPROVEMENTS.**—At the Eureka Con. Reduction Works a fine new lathe, drill press and engine have been added to the plant. At the assay office the latest improved Oertling assay scales have been received.

#### Montezuma District.

**SILVER MINES.**—Esmeralda Herald, March 10: The Montezuma district is only a few miles across the valley and in an easterly direction from Silver Peak. This district was formed many years ago, and at one time was the scene of considerable activity in mining. There are a great number of silver mines there, which were formerly owned by Matt Plunkett; they were by him sold and in time became



the property of the Shawmut M. & M. Co., who recently sold all their mining property to the Peruvian Mining Co. of Maine. In a few days the present owners will assume the management and the work of development of the mines, which for the past year has been attended with the running of the mill and consequent bullion shipments. It is supposed, however, that there will be an increase of working force on the different mines; among the most important are the New York, Bullion, Nevada and Great Eastern, all of which have flattering prospects, with an abundance of ore in sight to keep the 10-stamp mill in constant operation.

#### Philadelphia District.

**BARCELONA.**—*Silver State*, March 3: We learn that the lessee of the Barcelona, who also owns the Belmont property, is preparing to commence working some of the huge ore dumps of the Belmont mine that have lain idle for 50 many years. Some 10,000 tons of second-class ore are mined and ready for reduction; one dump close by the hoisting works of 2000 tons averages by several assays 20 ounces in silver per ton. There is a gang of men at work mining ore from the 200-foot level that goes—some of it first-class—over 500 ounces in silver per ton, while the second-class will mill 50 to 100 ounces. The Belmont has a vertical shaft 620 feet deep and has produced about \$2,000,000 from its upper workings. There are 2000 feet of this patented ground that can be worked from this shaft—and it is all virgin ground; never has a pick been struck into it. This shaft has a powerful hoisting engine in perfect order over it. The mine is supplied with two large steam pumps that handle the water from the top to the 300-foot level. Since then, however, an eight-inch Cornish pump has been put in that handles the water with ease to the 620-foot level. The cost of this pump and separate engine was over \$60,000. The lessee of the Barcelona and owner of the Belmont has lately milled 100 tons of ore from the dumps and from the mine with such success that he feels certain that this property is of great value and will be no longer dormant. We are satisfied that the railroad now under survey and soon to commence its grading, which will come within a few miles of Belmont, will enhance its value.

#### Pioche District.

**CONCENTRATORS.**—*Cor. Pioche Record*, March 7: The Ely G. M. & Co. are putting in the concentrators which recently arrived. As soon as they are put in, and the teams can haul ore, the mill will start up and will make what is certain to be a successful run. The mine is looking splendid, and while no ore has been taken out except what was encountered in prospecting the mine during the past winter, still the dumps are full of ore and no more miners can be put on until the teams come to clean off the dumps.

#### Red Mountain District.

**SILVER PEAK.**—*News*, March 10: The Silver Peak mines are situated in Red Mountain mining district, embracing a scope of country in the southern part of Esmeralda county. This district has large and well-defined ledges; the mines therein are as valuable as any on the Pacific Coast. It was from 1867 to 1871 that the Peak was booming—when an Eastern company operated the Red mountain mines. For the past year several of the mines have been boded to an English syndicate; this syndicate has devoted considerable time to a study of those mines, and from time to time has caused the immense veins to be sampled and tested. A few days ago Mr. E. Hooper, superintendent of the Garfield mines, visited Silver Peak to take samples from its mines and report thereon in the interest of those to whom the property has been bonded and to whom, no doubt, a sale thereof will be made. Among the most valuable is the Drinkwater mine, a vein of immense proportions. It is situated about eight miles from the town and is worked from a tunnel running parallel with the ledge. The tunnel is in 400 feet. The ledge is 60 feet in width and is diffused with gold throughout its entire width. A winze is sunk in the tunnel at a point 200 feet from its mouth, and is known as Winze No. 1; it is down a depth of 75 feet, whence a crosscut is made to the hanging and foot walls. This mine has been leased to John Chiatovich for several years, during which time he has kept his original little five-stamp mill hammering away and producing gold bullion. This mill has been enlarged and is now of 10-stamp capacity. During the past year Mr. Chiatovich has had a force of 30 men (miners, millmen and teamsters) employed. He has worked 3000 tons of Drinkwater ore, which has yielded \$20 per ton. There is also the Last Chance mine, a location on the same vein, which has been sufficiently developed by incline, shafts and cuts to indicate a mine equal to that of the Drinkwater. There is also the Crown Glory. It is well named, situated as it is on the crown of the great lead and is the "same thing" as the others.

#### Tuscarora District.

**NAVAJO QUEEN.**—*Times & Review*, March 9: Crosscut 200-foot level extended 12 feet during the week.

**COMMONWEALTH.**—South drift, 150-foot level, has been advanced 20 feet, showing some fine ore in the face to-day, indicating a closer proximity to the ore body than expected. No. 1 west crosscut has been extended 25 feet. No. 2 west crosscut has been advanced 21 feet, with ore in the face assaying \$67 per ton. Intermediate drift has been extended 6 feet, and has cut the same ore as in the shaft below the 100-foot level, assays from which return \$1392 per ton. Have stopped work at this point, and started another drift to open up this ore body farther north.

**NORTH BELLE ISLE.**—North lateral gangway, 400-foot level, is now following the vein, which averages several feet in width, and as developed north shows a continuous improvement. The opening of the stope north of No. 3 crosscut, 300-foot level, is developing a good width of ore. Upraise from the 70-foot level is up 36 feet. The ore continues, and the grade is good. Crosscut on this level, to connect with the main shaft, has been extended 20 feet. The stopes at all points are yielding the usual grade of ore. The shipment of bullion during the week amounted to \$101,560.99.

**FOUND TREASURE.**—Stope from No. 1 chute yielding ore as usual. Upraise from 50-foot level has been run up to the surface, the level put in order and work discontinued on it.

**NEVADA QUEEN.**—On the 350-foot level, west crosscut has been advanced 13 feet. The rock is

breaking better. North drift on the east vein has been advanced 22 feet in low-grade ore. A crosscut at this point has been run 13 feet, exposing very fine ore. The ore on the hanging-wall side is not so good as that toward the foot.

**PONDERE.**—North drift advanced 6 feet; ledge 2½ feet thick. Cut 6 inches of high-grade sulphuret ore in the bottom, which is rising in the face of the drift as we advance into the hill.

**BELLE ISLE.**—North drift from east crosscut, 250-foot level, has been extended 7 feet. The ledge shows some improvement. Workings in the old stopes are yielding some ore.

**GRAND PRIZE.**—Mill has been cleaned up and shut down, the final bullion shipment of \$15,224.24 having been shipped this week.

**NORTH COMMONWEALTH.**—Have resumed work in the incline shaft. Work at other points on the surface will be commenced very soon.

#### ARIZONA.

**TIP TOP.**—*Prescott Courier*, March 9: Mr. E. G. Wager, of Tip Top, favors us with the annexed news: There were two line strikes in this camp last week. About two feet of 500-ounce silver ore in the Wallapai mine owned by Tom Wade & Louis Johnson, and a new chimney of very rich sulphuret ore on the second level in the Silver Museum mine, formerly known as the Smithline mine, owned and worked by a Trinidad, Colorado, company. In Carpenter Gulch, Tom Montgomery and Chas. Wilcutt are making about \$100 per week mining and extracting gold rock, and C. E. Champe, Frank Miller and Philip Mischler are developing some fine properties in the same locality, and are all liable to come out rich and respectable. A great many claims in the district are being worked by chlorides, all of whom are taking out more or less ore, and ores are being constantly shipped out, and the present gives promise of being the most prosperous year ever known in this camp. We could afford to pay \$10 per ton more to carry our ores to the sampling works in Prescott than we do to ship them to El Paso or Socorro, but we can't get transportation over the roads as they are now. We live in hopes that ere many years a railroad will be built from Phoenix to Prescott, and coming within eight or ten miles of us on either side (there are two feasible routes), we can ship whichever way we please, and the district will be developed into a big producer.

**ARIZONA COPPER COMPANY.**—*Clifton Clarion*, March 7: The Coronado mine has started operations with a small force and is shipping little ore regularly. In the course of a week or so the great mine will be worked for all it is worth. Consequent upon the resumption of work on the Coronado, many changes have taken place, among which we note: Foreman M. A. Kelly has been transferred to the Coronado from the Metcalf, H. A. Gould being promoted to the position formerly occupied by Mr. Kelly at the latter place. Frank Strauss will foremanize at the King. Ed Whelan has been transferred to the top of the incline at the Coronado, Mr. Findley taking Mr. Whelan's former position at the King. A boarding-house is being erected at the Coronado. A dwelling-house will also be put up as a residence for the foreman. Three furnaces of the company are kept running to their full capacity at Clifton without cessation, and a most satisfactory production of bullion is the result. The experimental hot-blast furnace in course of construction is gradually approaching completion under the superintendence of Wm. Joos.

#### COLORADO.

**FURNACES.**—*Denver Tribune-Republican*, March 10: One more water-jacket furnace and six additional calcining furnaces have been contracted for by the American Smelting Co. These improvements would indicate that not all the smelters at Leadville are going to give in to the railroads, but rather that the contest will continue. The American Co. is closely allied to the Midland Railway Co., as a number of persons are stockholders in both companies. In making the additions announced the American smelter will secure desirable facilities for reducing sulphide ores, in which direction all the Leadville smelters have hitherto been very deficient. The supply of carbonates is daily decreasing while the yield of sulphides is on the increase, so that in order to continue smelting operations successfully it became necessary to erect a large number of roasting furnaces. It is predicted by those familiar with ore bodies of Leadville that within two to three years four-fifths of the output of the once famous carbonate camp will consist of sulphides instead of carbonates and that very little ore, outside of the iron product, will then be found ready for the smelting furnace, but that nearly all the mineral will have to undergo preliminary treatment. The expense of adding and operating roasting furnaces is considerable and the action of other smelters in this direction will be looked for with interest. If others follow the example of the American, it may be accepted as a settled fact that the Leadville smelters are not only determined, but able to continue business; that their situation is not as critical as has been represented, a question that has lately afforded considerable discussion.

#### DAKOTA.

**COLLINGWOOD.**—*Black Hills Pioneer*, March 7: Word comes from Carbonate that lessee Jefferson et al. have struck a good thing in the Collingwood. The force put on, consisting of five men, started drifting from the 100 level of the shaft. The drift was run in a southwesterly direction, following stringers of ore that appeared in the shaft. Though only a few feet have been made, these stringers have led to a solid streak several inches in width, that is apparently widening as each foot in distance is gained. The ore is of high grade, assaying in excess of 100 ozs. silver per ton. Parties interested are said to be jubilant at the results already reached, and more than pleased at the prospects immediately in view.

**RATTLER-GILROY.**—Excellent reports concerning the Rattler-Gilroy continue current. The fact that the mine is in better condition now than perhaps at any time in its history is without dispute. A quantity of high-grade ore, from which a number of toos have been shipped to the smelter for reduction, is

in sight. Whether the lead will prove permanent, only future explorations will determine. Work goes on unremittingly both day and night, and its results for the last few days are said to have been most encouraging, holding forth the promise, as before stated, that the property will hereafter, in all probability, more than pay its own way.

**SPANISH R.**—Work on the upraise has been delayed somewhat, as one of the contractors for timbering has recently been ill, and consequently operations here were in a measure interfered with. A part of the regular force, not working in the upraise, is employed in extracting ore. The superintendent is getting ready for further shipments to the Iron Hill smelter after it is blown in again next Monday.

#### IDAHO.

**BAYHORSE.**—*Idaho Messenger*, March 8: The Ramshorn is the oldest mine in the district, and its lowest workings are down on the vein 1400 feet deep, with levels connected all the way up, forming a complete network. The last 500 feet of the mine has been stopped but very little, thus leaving almost solid ground, pierced by tunnels every 125 feet, all starting and running in on the vein, the longest tunnel being 1700 feet long. Ore from this mine is sent down on a wire tramway, and then hauled down-hill two miles to the smelter. The company has four mines including the Ramshorn, all being on the same vein and similar, and all being operated. The Sky Lark, close by the Ramshorn, which has produced 900,000 ounces of silver, is being operated by A. J. Crook & Co. with profit, and it now looks better than it ever did before. Their high-grade ore, going 300 ounces in silver, is shipped to Omaha, and the low-grade is reduced at the Clayton smelter. The mines close to Bayhorse, owned by Mr. C. E. Taylor, are having some work done on them. Mr. Toole says in summing up the situation that the general outlook of the camp is at least 100 per cent better than it has ever been in the past. The Ramshorn is the deepest paying mine in Idaho or Montana, and it can easily go down to 2500 feet.

**ORO FINO.**—*Owyhee Avalanche*, March 6: Mr. T. Regan and Supt. B. S. Howe, of the Henrietta mine, returned from Boise City on Monday last. From Mr. Regan we learn that mining operations in and about the Oro Fino group of mines will be pushed with the utmost speed as soon as mining material, such as wood and timbers, can be furnished at the mines. In the meantime the drift on the Sinker lode will be continued with all the men that can be worked, and will not be stopped until the Oro Fino ground has been reached. As soon as possible the main shaft of the Oro Fino will be sunk considerably deeper than it is, levels will be run and the mine opened up as it never has been. Indeed the mining outlook for Owyhee was never brighter than at the present time.

**FLINT.**—We hear that a letter has been received here which says that 25 or 30 men will be put to work at Flint in developing the mines. A shaft will be sunk on the Rising Star to the depth of not less than 1500 feet, and levels run to prospect the ground, something that ought to have been done long ago, and which we have reason to believe was advised. We have always had great faith in Flint, and we have not lost any by reason of the present company building a mill and shutting it down without having gone below the grass-roots in prospecting their mine.

**WAGONTOWN.**—We mentioned last week that W. F. Sommercamp, Sr., had cut with his crosscut at Wagontown a large and rich ledge of free-milling ore, carrying gold and silver. Since then development shows it to be one of the best prospects in the camp. The lode is large and the ore very rich.

#### MONTANA.

**SMELTER.**—*Anaconda Review*, March 8: Work at the Anaconda smelter has been crowded the past few weeks as fast as men could do it. The grading for the new building just north and adjoining the present new smelter is well under way. The company had a very large force of men and took advantage of the fine weather and will soon have it ready. The masons and bricklayers have been hard at work the past two days on the foundations. Inside the new concentrator building are three Ball stamps dropping on copper ore, and the silver-mill running at about half capacity. The changes to the new 1000-horse power are now completed and it has been running a portion of the time, though the water-wheel is the principal power which runs the works. Large quantities of lumber and material of all kinds are being received, and as soon as the weather is settled there will be a far larger force working than ever before.

#### NEW MEXICO.

**NOTES.**—*Socorro Bulletin*, March 10: A rich strike of ore is reported in the Ocean Wave mine at Hermosa. The St. Charles-Creigher lease at Hermosa is still turning out big ore. The Templar and Virginian under the superintendence of Col. Hopper is working 30 men. The Oro Fino mine in Water canyon is showing up fine. Free gold is coming in at the bottom in quantities. We are informed that the Merritt mine, situated in the Socorro mountain, will soon be in operation again. Another strike is reported in the Ocean Wave at Hermosa, Sunday. The mining wave is gaining strength. Adna Lamson has transferred his interests in the copper properties situated in the San Andreas to present owners, who will put a force of men to work extracting ore under the superintendence of Mr. Lamson. The Gr at London mine, located in the San Mateo mountains, and owned by Fred Keith, J. W. Richardson and L. R. Whitmore or San Marcial, and Major J. S. Sniffen of Socorro, is now turning out ore which runs three ounces gold. A small shipment was made to Deover last Monday.

**CONCENTRATOR.**—*Rio Grande Republican*, March 10: The Bently concentrator has worked ore successfully from nearly every mine in Hermosa camp. The Organs want concentrating works badly, and if they were put in it would not be long before 20 or more mines in that district which are not worked would be paying.

**STRIKES.**—*Kingstoo Shaft*, March 8: All the late strikes are holding out. Two more made this week of greater importance than any since the Comstock. More working mines, more and better pros-

pects and prospecting ground around Kingston than in any part of the Southwest. Better mines and better prospects are now opening than the mine from which came the two-ton chunk. A \$40,000 deal is pending on the Butte, which joins the Black Colt on the south.

#### OREGON.

**GRANT COUNTY MINES.**—*Cor. Bedrock Democrat*, March 8: The snow is almost gone and the miners are beginning to rally. The present season promises one of great importance to quartz miners in this section. New strikes are reported almost weekly. Geo. Bently recently struck an eight-inch vein of free-milling quartz showing gold all through. The Colorado also reports a new strike. Keystone showing well. The Eagle, under the control and management of the genial and efficient superintendent, R. K. Foster, is showing up well and promises a bonanza to its owners, Eblen & Foster. In fact all the mines are looking well. If the weather continues favorable the placer mines will soon be in operation.

**QUICKSILVER.**—*Jacksonville Times*, March 10: James Chenoweth, who has been operating a quicksilver mine in Douglas county for some time, using three retorts with very good success, has ordered three new retorts here of the capacity of a ton of ore each. Mr. Chenoweth has a whole mountain of cinabar, and as mercury is in good demand and brings a remunerative price, there is a good prospect of a further increase in the plant and output before long.

**WAGNER CREEK.**—*Cor. Jacksonville Times*, March 10: Mr. James Briner has completed a roasting furnace on the creek. It is built on a small scale, merely as an experiment. Mr. Castiel of your city is one of the solid miners here; also W. F. Shaffer, lately of Gold Hill, as well as several others, among whom is Mr. Pittner of Phoenix, an experienced miner from the Empire mine of California. Mr. Philip Mullen is the amalgamator; C. Frank Lewis, engineer.

**GOOD PROSPECTS.**—*Rogue River Courier*, March 8: James Ferren and N. Thoss are prosecuting work in their Silver creek placer mine with a vigor. Sluicing was carried on all winter and now prospects are glittering. This mine extends along Silver creek for a distance of two miles, and Mr. Thoss thinks will eventually prove one of the best paying mines in the county.

**MILL.**—H. H. Keisling, who has control of the old Knox mine by bond, on Applegate, has put in a quartz-mill, which is about ready for use.

#### UTAH.

**PARK NOTES.**—*Record*, March 10: Active work is going on in the Southern Tier and also in the Black Diamond of Snake creek, with favorable prospects in the latter. Within a few weeks the new connections from the lower tunnel will have been completed in the Southern Tier. On account of bad roads and the inability to transport coal and other supplies, work on the Fairview group, between the Empire and the Sampson, had to be temporarily suspended. However, the mine is well prospected. The west drift is in on the vein 134 feet and the east drift has been run 116 feet, and show ore all the way. The two walls are well defined, carrying a true fissure vein, running east and west; it is from eight inches to two feet wide. The ore is high grade, and as soon as greater depth is attained the Fairview will be a good-paying mine.

**ORE AND BULLION SHIPMENTS.**—The Ontario mill will make another bullion shipment to-morrow. During the week the Crescent shipped 130,000 pounds of first-class ore. On Tuesday 8 bars of Daly bullion, 9339 fine ounces of silver, were shipped from the Marsac mill, and to-morrow another shipment will be made. For the week just ended and since ore-shipping was resumed, the Mackintosh sampler received 190,050 pounds of Ontario ore and 38,830 pounds of Sampson ore.

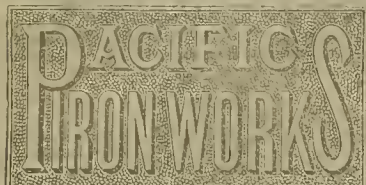
#### WASHINGTON.

**TERRITORIAL NOTES.**—*Ellensburg Capital*, March 2: The giants are now successfully working the Swauk placers. The iron mines of Cle-elum will be worked extensively this year. It is asserted that natural gas can be found in Ellensburg at a depth of 800 feet. At least ten of the Upper Cle-elum gold and silver mines will be worked this season. Arrangements are being made to start up the Hydraulic Co.'s Works north of Ellensburg. In April the Iron Mountain mines will begin shipping iron ore to the Union Iron Works in San Francisco. Nevada miners have been prospecting the gravel beds within a few miles of Ellensburg, and pronounce them good pay. The Chinese are preparing to work the bars along the Upper Columbia this season. Last year they found considerable gold, which they sold in Ellensburg. The *Capital* was mistaken in its statement that the largest nugget ever found on the Swauk weighed \$300. The largest was worth \$760, and was bought in Ellensburg.

#### WYOMING.

**BIG HORN MOUNTAIN.**—*Black Hills Pioneer*, March 10: More than ordinary interest has been taken in the reported discovery of quartz lodes narrowly rich in gold, near Buffalo, Wyoming. In Deadwood at present are a number of prospectors who at one time or another have hunted assiduously for the coveted ledges in the Big Horn range. Conversation with one or two of these was recently had by a *Pioneer* reporter. From them the impression was gathered that the reported discovery may very possibly prove true. From the prospecting they did in the range, they are satisfied that that section of Wyoming will eventually prove wonderfully productive of the precious metals. Encouragement was constantly met, numerous croppings of ledges were found from which pieces chipped displayed free gold, or when taken to an assayer showed it possessed considerable value. The reasons inducing these parties to leave the Big Horns in the face of such promising prospects are obvious, inasmuch as the country was at the time infested with hostile redskins. Two or three have expressed an intention of returning. Correspondence has been opened with reliable residents of Buffalo, whose replies are awaited with a good deal of interest.





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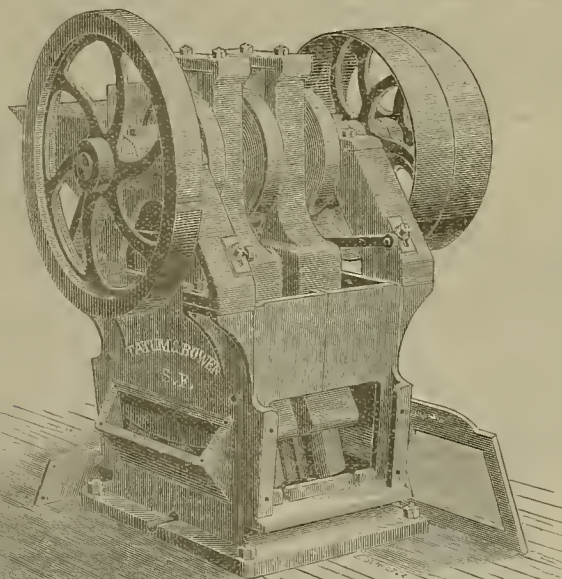
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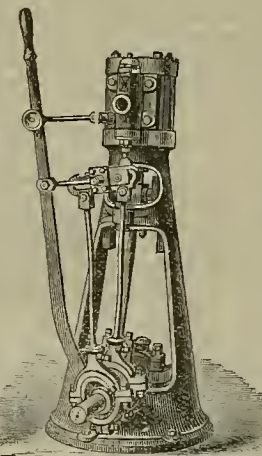
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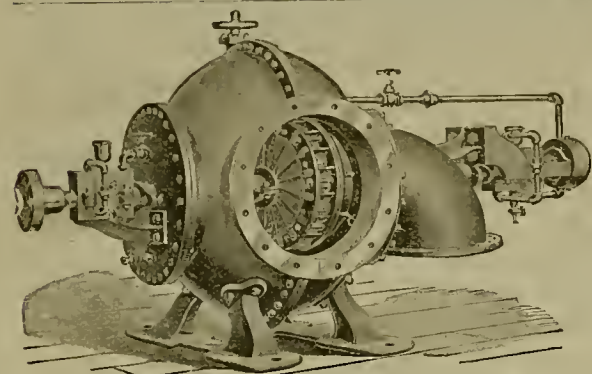


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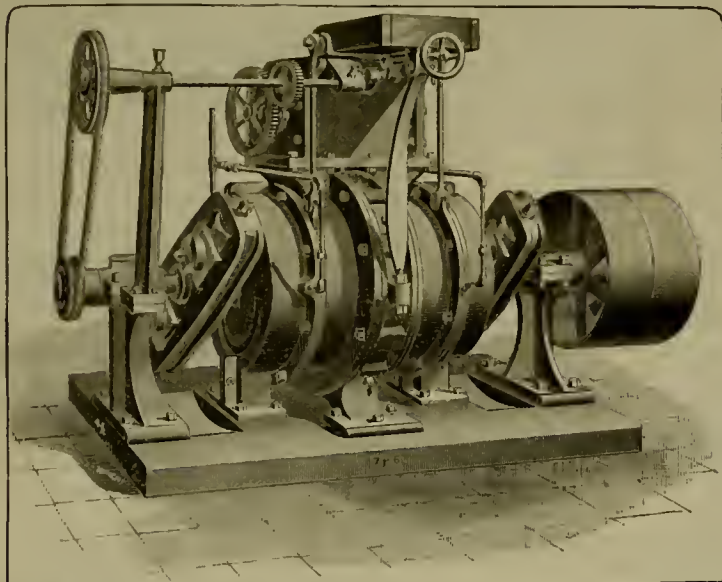






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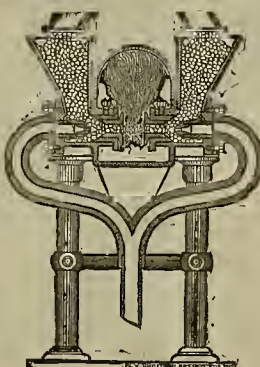
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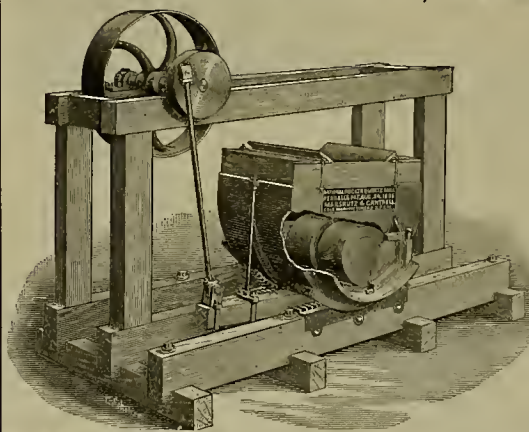
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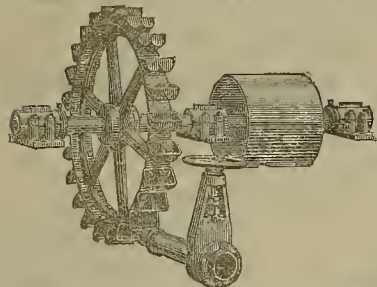
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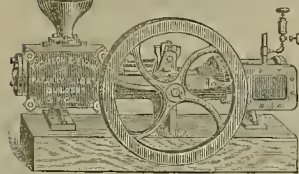
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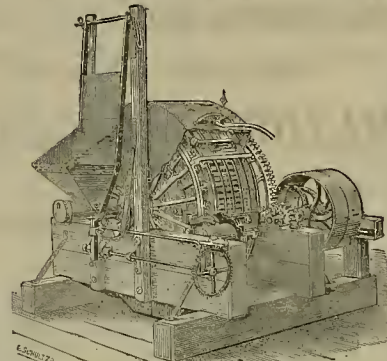
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WORKS ORE WET OR DRY.

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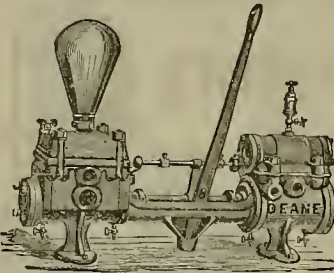
AGENTS FOR THE PACIFIC COAST FOR THE

**Deane Steam Pump.**

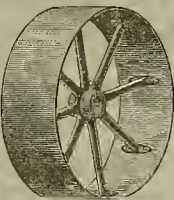
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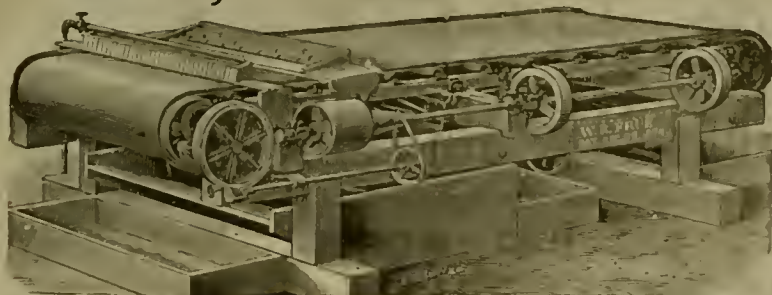
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PRICE: FIVE HUNDRED AND SEVENTY-FIVE DOLLARS (\$575.00) F. O. B.

OVER 1400 ARE NOW IN USE. Concentrations are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

THE MONTANA COMPANY (Limited), London, October 8, 1887.  
DEAR SIR:—Having tested three of your Frue Vanners in a competitive trial with other similar machines (Triumphs), we have satisfied ourselves of the superiority of your Vanners, as is evidenced by the fact of our having ordered twenty more of your machines for immediate delivery. Yours truly,

THE MONTANA COMPANY (Limited).  
N. B. Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

Protected by patents May 4, 1880; December 22, 1884; September 2, 1887; April 27, 1888; March 22, 1891; February 29, 1883; September 18, 1883. Patents applied for.

**THE FRUE ORE CONCENTRATOR OR VANNING MACHINE.**

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Room 7, No. 109 California Street, SAN FRANCISCO, CAL.

WM. H. TAYLOR, President.

R. S. MOORE, Superintendent.

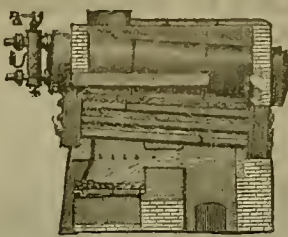
L. R. MEAD, Secretary.

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60,000 Horse Power now in use.

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WROUGHT IRON WATER PIPE a Specialty. Note.—Have just completed order for 35 miles of 44-inch pipe of 4-inch iron for Spring Valley Water Works Company, San Francisco.  
SAW-MILL MACHINERY of all kinds.  
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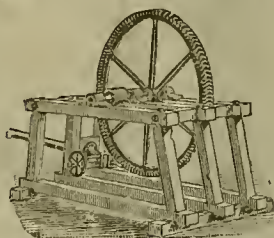
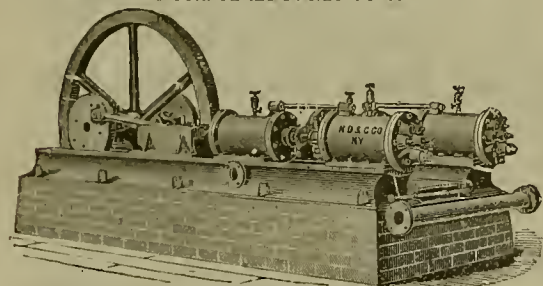
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WILSON'S PATENT GAS-PRODUCER.  
STEAM BOILERS of all descriptions.  
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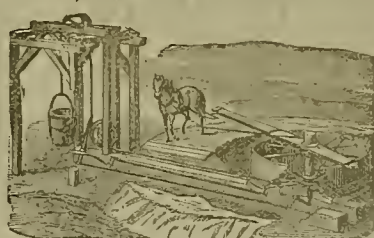
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SINGLE OR DUPLEX, STEAM OR BELT POWER.  
62 Sold on the Pacific Coast.



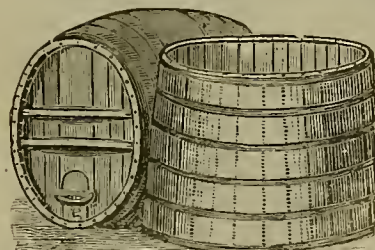
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All wrought iron. No gears, no breakage.  
One horse will easily handle rock or water to a depth of 350 feet, giving entire satisfaction to the prospector.  
Price, complete, \$200. 150 sold on this Coast.



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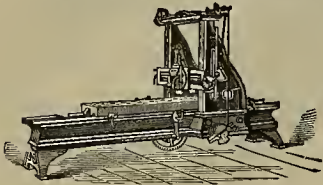
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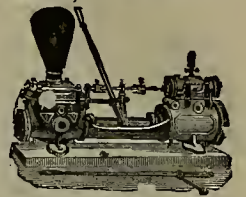
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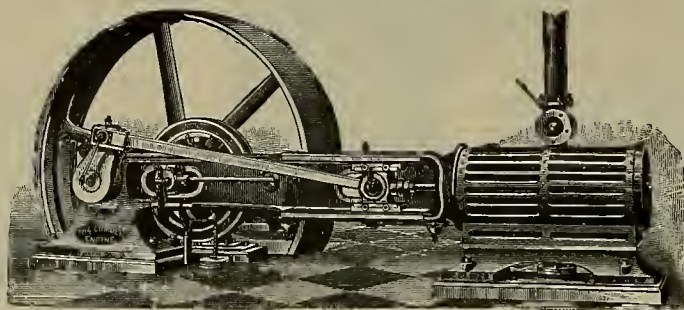
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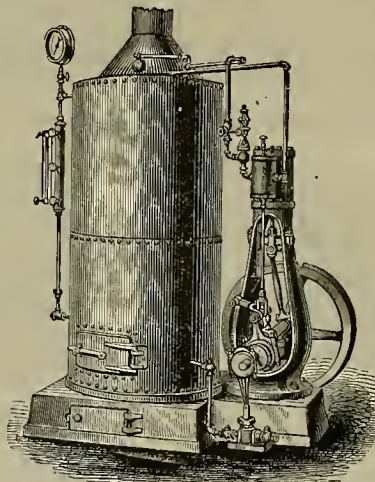
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Upright Engines and Boilers Connected.

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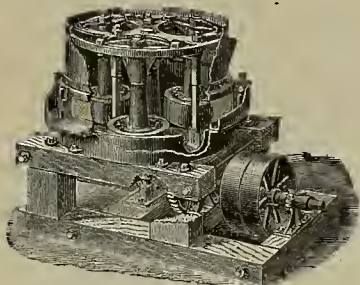
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**Single and Double Circular Saw-Mills.**

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Centrifugal Roller Quartz Mill.

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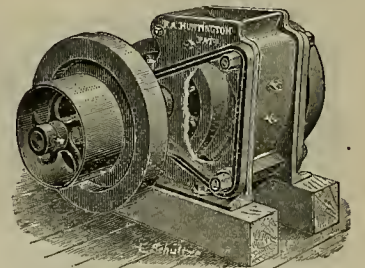
**Centrifugal Roller Quartz Mills,****CONCENTRATORS AND ORE CRUSHERS.**

Mining Machinery of Every Description,

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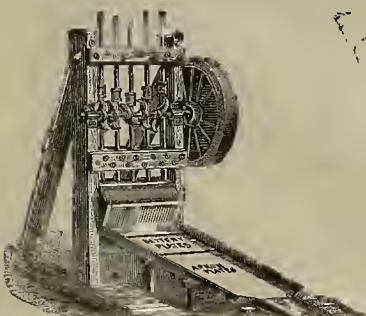
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WE ARE SELLING

**Silver-Plated Amalgamating Plates****For Saving Gold in QUARTZ, GRAVEL and PLACER MINING,**At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best,  
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purchased of JOHN TAYLOR & CO., cor. First and Mission Sts.**SAN FRANCISCO GOLD, SILVER and NICKEL PLATING WORKS,**

E. G. DENNISTON, Proprietor.

653 &amp; 655 Mission St., San Francisco, Cal.

NOTICE.—Mining men are cautioned against fraud in purchasing poor mining plates made in this city; they have proved  
defective in the Silver-plating, and in having much less Silver than was contracted for. When in doubt make an assay; thin,  
light Silver-plating looks the same as heavy. SEND FOR CIRCULAR.



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MARCH 24, 1888.

VOLUME LV.  
Number 12.

## Air-Compressors of To-day.

The vast number of uses to which compressed air is indispensable has demanded that the manufacturers of at least one air-compressor should devote their entire time and attention to the perfection of a machine, for which there is such an ever-increasing sale. The new and improved pattern of the Clayton air-compressors, the

completes the cooling and fills the small clearance spaces.

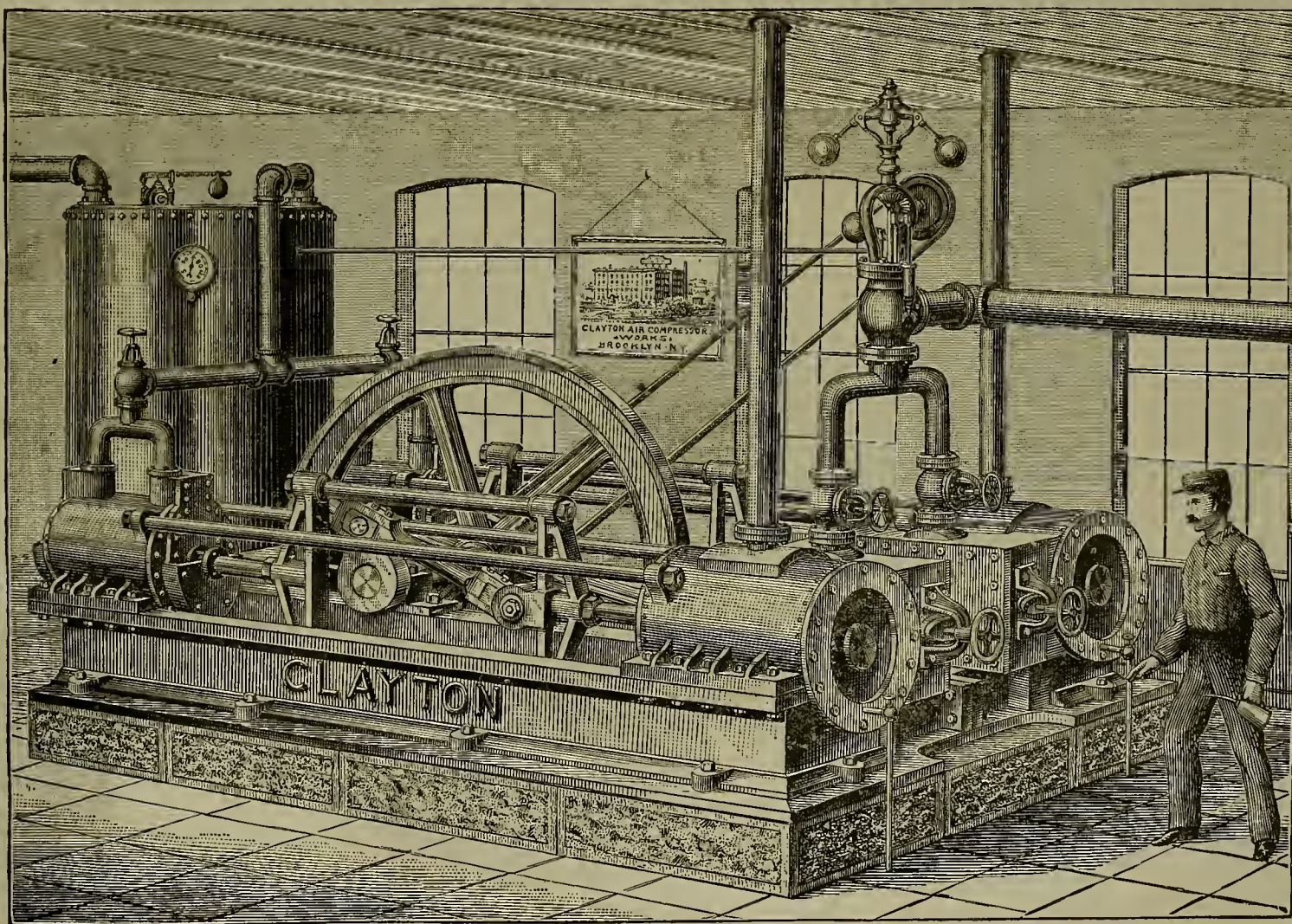
Another noticeable point is the connecting-rod arrangement, which is made adjustable, so as to carry all the weight of the pistons, rods, etc., and relieves the cylinders from all wear, excepting that caused by the expansion of the piston packing.

The patent safety suction valves are protect

design and construction, would be far from perfect.

This governor operates by cutting off the steam from the air-pressure governor, when the desired pressure of air is attained, and when the pressure is reduced, ever so slightly, it turns the steam on again. The speed governor in combination with the air-pressure governor regulates the speed of the compressor; it

pressors are also made to run by belt, so that if one has water-power available, he can, by the use of a belt air compressor, convert his water into compressed air-power, which will run any machine that can be run by steam. They are also made single with one steam and one air cylinder, or, if necessary, one side of a duplex machine can be detached and run independent of the other. In writing



THE IMPROVED CLAYTON "DUPLEX" AIR COMPRESSOR.

outcome of years of experience, is shown in the accompanying illustration.

Among the features of these compressors, for which the manufacturers claim superiority over other makes (and which will be seen by referring to illustration), are the patent water-jackets which encircle the air-cylinders and effectually cool them their entire length. As the patent on these jackets covers the only practical and efficient method of cooling air-cylinders by the circulation of water around them, an attempt has been made by other makers to disparage their use, but the manufacturers are prepared to demonstrate the advantages of a compressor, using a water-jacket over one without. A small spray of water (or oil) is injected into the air-cylinder with the air, which

is prevented from falling into the cylinder by means of the safety stems, and the independent cut-off valves (shown at the end of steam chests) can be adjusted to cut off while the compressor is running; and as the air pressure is always the same, the valves can be set to cut off either at one-quarter or one-half, or at any part of the stroke as will best suit the circumstances.

The "Clayton Duplex air-compressors" occupy much less space than other compressors of equal capacity, and the fly-wheel is in the center of the machine. Of the other improvements, we must refer readers to the maker's catalogue for a detailed description. We must not, however, omit mention of the patent combined speed and pressure governor, without which these compressors, with their excellent

works perfectly, and is guaranteed to control both the speed of the compressor and the pressure of air, without any attention from the engineer.

The Clayton air-compressors are especially designed for running rock drills, coal cutters, hoisting engines, pneumatic locomotives, etc., in mines, especially badly ventilated ones, the exhaust furnishing cool air for the miners to breathe. Or, if the hoiler is so situated that the steam has to go a considerable distance in a pipe, the loss of power through the condensation of steam is very great, and the advantage of using the steam to run an air-compressor, and sending compressed air through the pipes to work the machines, is obvious, as the loss in friction is little or nothing. These com-

for estimates or prices on an air-compressing plant, the principal things to be stated are the number and size of machines to be run, or the volume and pressure of air required, and the boiler pressure carried. The Clayton Air Compressor Works, 43 Dey St., New York, would be pleased to send their catalogue on application, and to enter into correspondence with any who consider the advisability of supplanting steam with compressed air.

The mines of Gilpin county, Colorado, produced \$2,479,180 in 1887, and \$32,298,342 for the past 16 years, showing an average of a little over \$2,000,000 per annum. At the close of 1887 there were 452 stamps in operation in the county, and 330 stamps idle.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—Eds.

## Calaveras County Mines.

## Murphys District.

EDITORS PRESS:—The mines at present claiming special attention in this district are the Hidden Treasure, Piety Hill, Mattison Extension and Poverty Hill. This promising group of mines is located in the eastern part of Murphys townsite. The Hidden Treasure, Piety Hill and Mattison Extension are all on one lead with the Poverty Hill on a parallel lead. All of the claims are 1500 feet in length with a surface width of 300 to 600 feet. This group of mines was first discovered by W. Barnes in 1856; from that time up to 1858 about 50 tons of rock were worked for the free gold only. In 1858 a run of 50 tons was made for the gold only; this gave an average of \$43.50 a ton. Shortly after this Mr. Barnes died and the mines remained idle until 1883, when Mr. J. Moss came into possession of the property, and, in connection with Mr. J. Mattison, prospected one of the locations. In May of 1887 Mr. D. W. Stone purchased Mr. Mattison's interests and development began in earnest. Messrs. Moss and Stone have done all the work on the mines themselves, even to getting out the timbers in the mountains for the mines. Patiently, steadily working away, experienced miners and millmen, they have seen growing under the stroke of pick and drill a property that to-day has few superiors.

On the Hidden Treasure a shaft has been put down 35 feet, showing a three-foot vein of ore carrying galena and sulphurets, gold and silver bearing. On the Piety Hill lode a shaft 90 feet in depth has been sunk, proving a 2½-foot vein of galena and sulphurets, rock, from which 40 tons have been worked for the gold alone and gave \$43.50 a ton.

On the Mattison Extension a shaft 50 feet in depth discloses a 2½-foot vein. From this vein two lots of ore have been worked by the Selby works of San Francisco which gave: Lot No. 1—gold, \$70.84; silver, \$20.29. Lot No. 2—silver, \$29.47; gold, \$100.99 a ton. On the eastern end of this claim open cuts for a distance of 300 feet show a vein of an average width of 12 feet, carrying free gold and assaying \$150 to the ton. At this point a parallel lead crops out. An open cut on it shows a two-foot vein of rich rock; a lot of rock from this lead, milled for the free gold only, gave \$10.60 a ton.

Poverty Hill parallels the other three locations. On this lead is a 40-foot shaft showing a 2½-foot ledge that glistens with galena and sulphurets. Open cuts along the surface for 300 feet show a large lead of evenly mineralized rock, all high-grade ore. Of the three leads and five locations it is a difficult matter to say which is the richer or most promising, as the leads are not 100 feet apart. The average size is about the same, and they are all of the same general character. That the richest rock has not been milled is evident.

An examination of the ore sacked for shipment shows it to be only of the average character of the vein. There is not a shaft, open cut or cropping hut shows mineral, and in most instances a large per cent of the rock is rich. Pieces of rock broken from the croppings here and there, in every instance showed mineral, and in most cases, free gold. This group of veins is in limestone with porphyry dykes. The veins are almost perpendicular. As several feet of decomposed vein matter accompanies each vein, the expense of sinking and extracting ore is comparatively small. No water has been encountered in any of the shafts. The hill on which the mines are located pitches to the east, affording a fall of 150 feet for millsite and water-power, the Union Water Co.'s ditch crossing the mines at their highest point.

There is in this group of mines all that could be asked for in a mining property; first, an abundance of high-grade ore; second, the ore can be mined cheaply; third, millsite with water-power can be had; fourth, it is in a section of country where mining can be conducted on every day of the year. Labor and mine supplies are cheap. All that is wanting is capital to erect the necessary works to extract the gold and silver and this group will prove itself a "hidden treasure" indeed. The present owners are hard-working, practical miners, but without the necessary means to build works suitable for the extraction of the gold and silver in these galena and sulphurets ores. In consequence they desire to sell or arrange for the necessary works with a moneyed partner. To those looking for a good mine I would say investigate for yourself and you will see that the half has not been told. That unlike most mines it exceeds its reported value, and is a group that, taking everything into consideration that goes to make up a paying mine, is seldom equaled, if excelled.

E. H. SCHAEFFLE.

Murphys, March 7, 1888.

## The "Silver Plant."

EDITORS PRESS:—In your issue of March 3d you describe a plant which you called the silver plant. I will say for certain that the plant grows in our mineral belt. In the mineral belt of Tascara it is very common.

We have two of the kinds. That which you describe in your paper is quite common.

Another kind resembles that described, yet it is a different plant of the same species.

The No. 2 plant has a thick bunch or mat of leaves, green, and covered with a heavy coat of hair, the leaves being smaller than No. 1 and more "hairy." The stem shoots up the same as No. 1, but the flower differs from it in being of a mushroom or parasol shape. A cluster of small flowers, usually slightly colored, is found near the center, and the petals are rose-colored. Sometimes this flower is snow-white. It does not grow so rank or strong as No. 1. Usually the stem is from three to eight inches in height. The flower is from the size of a ten-cent piece to that of a two-bit piece. I have often noticed this flower, and thought it ought to have a place among our domestic flowers, as it is far superior to many of the flowers cultivated. I refer to what I call No. 2.

I will also state that I have no knowledge or do not remember of having seen either of these plants outside of the mineral belt in this vicinity. I have lived here for 11 years, and frequently make trips outside of belt, but don't remember of having seen said plants outside of the mineral belt.

A. B. McDONALD.

Tascara, Nev., March 7.

## Idaho Lead-Silver Mines.

## Immense Veins of Galena-Carbonate Ores.

EDITORS PRESS:—The famous Viola mine, two miles above the town of Nichol's, is producing more ore than ever. Nearly 75,000 tons of heavy carbonate ore have been taken out, most of which has been smelted at the Viola smelter. About 100 tons of carbonate galena ore is smelted daily, turning out about 40 tons of lead-silver bullion. Very large ore bodies are exposed in the Viola mine; in fact, the hundred-ton daily output makes a very insignificant hole in the ore, there being, at a conservative estimate, fully a year's run of ore in sight. About 200 men are employed mining, smelting, freighting, burning charcoal and chopping wood. Wages average about \$3 per day. Were all the mines in this region worked, there is no known section in the West that could rival its production of metal.

Nearly all the mines here are still owned by the prospectors or original discoverers, and these owners being unable to properly develop the claims, hold on to them from year to year, doing assessments and putting them in order for sale.

Were mining capitalists to come here they could pick up a number of very fine properties in this vicinity, among which may be mentioned the Andes silver mine, a large galena-carbonate lode; the Daisy Block, Ingersoll, and Latest Out, galena carbonate veins, and the Paymaster, a big copper lode. Besides these mines, which are partially opened, there are many very fine prospects in the country which show more or less pay ore and could be had cheap. In this immediate vicinity, say within 25 miles, the mines are almost exclusively lead, copper and silver. The veins are very large, being principally contacts and fissures, measuring from 10 to 60 feet in width, and continuous for hundreds of feet in length. The geology of the region is: Limestone (devonian and silurian), quartzite (primordial), porphyritic granite (archean), and dykes of porphyry breaking up through the sedimentaries; also, basaltic lava dykes near the base of the mountains.

It is typically a lead-copper-silver region and will, eventually, prove a very large producer of these metals. North and northwest of this place some 50 miles, the great Salmon-river gold region begins and extends to an unknown limit. This gold country, as elsewhere, is composed of slate, granite, and porphyry mountains—a great, broken, and strictly rugged region, which will be many years before it is half prospected. Some 300 miles of the above country (Salmon river) was examined by the writer last season, and it was all observed to be a mineral region of great promise.

CHAS. F. BLACKBURN.

Nicholia, Idaho, March 5, 1888.

## Cost of Handling Ores.

EDITORS PRESS:—In your issue of March 3d (page 134), the table giving the comparative cost of handling ores by the iron precipitation and preparatory calcination processes contains some typographical errors. The table should be as follows:

	By iron precipitation.	By preparatory roasting.
Cost of calcining 1 ton ore		\$4.00
" " " " " "	6.00	6.00
" " " " " "	2.00	
" " " " " "	2.00	
" " " " " "	1.00	
20 per cent of expenses saved by rapid smelting consequent upon preparatory roasting, etc.	0.40	
25 per cent fuel saved..	0.80	
Total cost of smelting 1 ton ore.....	\$12.20	\$10.00

Please make above corrections in your next issue and oblige

W. L. AUSTIN.

THE gypsum deposits of the Black Hills in Dakota are pronounced equal to those of Nova Scotia, which are the purest yet discovered. The manufacture of plaster has already begun at several points.

## Matting Dry Auriferous Silver Ores.

The following paper was read by W. L. Austin of Toston, Montana, at the Utah and Montana meeting of the American Institute of Mining Engineers:

The only essential difference among the three methods of collecting the precious metals from their low-grade ores by fusion is comprised in the nature of the vehicle in which those metals are concentrated. If lead or copper ores are used, the processes are respectively lead or copper smelting; but when the sulphide of iron forms the matrix in which the gold and silver are collected, the process is known as pyritic smelting. The latter method presents rarely any advantages when lead or copper ores are available at rates which permit profitable treatment.

## Pyritic Silver Smelting.

Defined by Percy as "the smelting of silver ores, which are either free from lead or do not contain it in sufficient quantity to collect the silver, in conjunction with pyrites, in order to produce a regulus in which the silver may be concentrated," is not, as the name would imply, confined to ores of this metal alone, but embraces auriferous silver ores, or even gold ores simple. This method of collecting the precious metals from low-grade dry ores, employed at Freiberg by Barthel Kohler in 1835, does not appear, up to the present, to have been introduced into this country on a working scale. And yet the possibility of getting rid in a single operation of all the earthy or siliceous gangue of a low-grade ore and concentrating the precious metals in a matte without loss of lead (which includes gold and silver) by elagging, or volatilization, at the same time producing a highly siliceous slag, very nearly if not quite as clean as is usual in lead smelting, certainly commends itself. In some parts of the country, owing to the competition met with from the large smelters, established at railway centers, lead ores (and by lead ores I mean such as in a smelting mixture furnish a sufficient percentage of that metal to permit economic smelting) command prices that render their treatment *per se* by local smelters an unremunerative operation; the result being that lead ores are drawn away to other establishments, leaving behind a greater quantity of low-grade ores not suitable either for the milling process or for concentration, yet which might be advantageously collected in an iron matte.

The absence of this one from among our metallurgical processes is partially due to the perfection of the American silver-mill, which, in the majority of cases where the above-specified ores are met with, is peculiarly adapted to Western conditions, namely, expensive fuel and labor. But the fact may be also accounted for by a disinclination to depart from the established lead-smelting process, even when the lead in the ore itself must be handled without profit, or, as is sometimes the case, at a loss.

During the summer of 1884, while engaged on professional work in Montana, my attention was attracted by the large quantity of

## Dry Silver-Gold Ores

Awaiting reduction. The available lead-ore supply seemed utterly inadequate for economic silver-lead smelting; besides, competition from outside had brought the ores up to such a figure as to render their treatment unremunerative, nor were many of the ores at all suitable for wet concentration. But to offset these disadvantages, extensive bodies of iron pyrites, within easy access of the dry ore, suggesting the practicability of pyritic smelting. A close examination of the field led to the conviction that such a process was the best means of beneficiating the majority of these ores, namely, those high in silica and low in silver and gold, and to the building of the Toston smelting works.

## Toston

Is a small collection of buildings on the bank of the Missouri river, about 40 miles east of Helena, on the line of the Northern Pacific, a point about equally distant, measured by cost of transportation, from the dry ores and the pyrites mines, and at the same time in close proximity to lignite coal and limestone quarries. The Toston plant was intended solely for experimental purposes, to determine how far the process was adaptable to Western mining enterprises, namely, to quick returns on capital invested, when coupled with those necessary adjuncts, expensive fuel and high-priced labor. At the time of starting these works, no information of the process having been tried in this country, beyond vague rumors of attempts made in Colorado, could be had; therefore there was no American precedent to serve as a guide. To copy the European practice with its large percentage of fluxing material, small furnace capacities, and high fuel consumption, was out of the question. The practice at Kongsberg, Sala, Lend, Freiberg, Schömannitz, Lower Hungary, Transylvania, and the Altai mountains was carefully studied as far as available literature would permit; and in the spring of 1885 the first furnace was built, a rude affair constructed wholly of sandstone, with water tuyeres, and the approximate dimensions of the ordinary Western lead furnace. The feasibility of the scheme was so conclusively shown by the operations of this furnace, that foreign capital took hold of the enterprise, and the experiments were continued with better apparatus. Different styles and forms of furnace were tried, including the

Herreshoff patent, and the works were being fitted up for handling a large amount of ore, when the recent passage of the Alien Act by Congress caused a suspension of operations, and resulted in the temporary leasing of the property to a company handling the newly discovered lead ore of the Cœur d'Alenes.

The three years' work at Toston demonstrated that, under conditions existing at that place, the

## Best Style of Furnace

For the matting process is what the Germans call a *Spur ofen*; that is, a furnace without crucible, which is closed a short distance below the tuyeres, and from which the smelted products are permitted to flow continuously. The many difficulties which presented themselves as long as a crucible furnace was employed disappeared altogether when that furnace was converted into a *Spur ofen*, and an outside receiver was attached. A duplicate of the Herreshoff furnace, which does such excellent work at Lanrel Hill, New York, was tried and abandoned, on account of the passage communicating between the furnace and receiver becoming constantly choked up. This may have been due partially to the tendency of iron matte to chill suddenly (its fusing point lying above both that of copper and lead matte), and partially also to the use of highly siliceous slags, which do not admit of rapid smelting, and consequently did not furnish a sufficient flow of molten matter from the furnace to the receiver to keep the passage open. On a basic charge and copper matte, the furnace is said to work perfectly. Narrowing the smelting-zone and depressing the tuyeres also assisted operations materially.

On the continent of Europe, blast-furnaces are used almost altogether for pyritic smelting (raw smelting as it is termed). At Sala, in Sweden, the furnace used is a *Spur ofen*, with a tendency toward the snmp type; but the latter is the usual style of furnace used for this purpose. They are generally built very high, of small capacity, with one or two tuyeres in the back; whereas, at Toston, the best results were obtained with a very low furnace and large volume of air. Considering the perfection which furnace-building in this country has attained, it should be possible with a furnace of large capacity (about 150 tons in 24 hours) to make very satisfactory returns.

The method of feeding a matting furnace is of the very greatest importance, for unless precautions are used, the easily fusible sulphide of iron agglutinates the charge above the smelting zone, and chokes up the furnace as fast as it can be barred off.

## The Slag

Made at Toston range in silica from 30 to 48, in protoxide of iron from 27.24 to 49.73, and in lime from 4.7 to 26.93 per cent. Numerous experimental slags were tried, the object being to run the silica up as high, and the lime as low, as consistent with economic work. It was found much more difficult to keep the silver than the gold out of the slag. Slags showing merely a trace of gold (duplicate crucible assays, one assay ton each) were made when the matte carried as high as \$67 per ton in the metal, and 125.5 ounces of silver. Although the silver would run up more often above than below an ounce, it did not, with the proper combination of silica, iron and lime, average as high as 2 ounces. According to Percy, the slag made at Kongsberg in Norway usually carries less than 1 oz. per ton (2240 lbs.) in silver on a matte running about 80 oz. per ton. Lime certainly has a very beneficial effect on the slag. Our cleanest Toston slags went high in silica and lime, and low in iron. As the losses are usually supposed to be mechanical, a siliceous lime-slag may assist the separation of the metal by reducing the specific gravity of the slag; but Percy's experiments in fusing Ag<sub>2</sub>S with different substances, among which are iron and lime, suggests a possible chemical origin for these losses. These experiments show that where a substance, such as K<sub>2</sub>O, NaHCO<sub>3</sub>, or metallic iron (?) decomposes Ag<sub>2</sub>S at a high temperature, the resulting fluid product carries considerable silver, while a great portion separates out in the metallic form; whereas, when lime is mixed with Ag<sub>2</sub>S and subjected to a white heat, no chemical action takes place. Keri also recommends a bisulfate carrying lime. However, I got very good results on a slag carrying the highest percentage of iron and the lowest of lime mentioned above. Local conditions make the economy of such a slag more than counterbalance the loss.

I am not prepared to say how far the

## Concentration of the Precious Metals

In no iron matte can be safely carried. The richest carload of matte shipped from Toston ran 3.35 oz. gold and 125.5 oz. silver (approximately \$200) per ton; but Keri speaks of concentrated matte made at Kongsberg, carrying from 583.33 to 759.16 oz. per ton (2000 lbs.), and my experience leads me to believe that a more valuable matte could be produced than that above mentioned as shipped by us. The loss both of gold and silver is almost wholly in the slag, and is usually explained as due to the mechanical adhesion to the latter of small particles of matte. The higher the temperature at which the separation takes place, and the lower the specific gravity of the slag, the better the separation and consequently the cleaner the slags. In Europe it has been the practice at most places where the pyritic process is used to roast, concentrate and desilverize the matte by a complicated series of operations, all having in view the production of bar-silver,



In this country, concentration and refining can be omitted from the calculations of the producer, as a ready market exists for the product at almost any of our large copper or lead smelting establishments. One offer for our Toston matte, f. n. b. at works was \$20 per ounce for gold contents, and 95 per cent of New York quotations on silver, deducting a treatment-charge of \$15 per ton and \$1.50 for freight. For lead bullion of the same grade, the best we could do at the time inquiries were made was for silver, 97 per cent of New York quotations, and for gold the same as in the case of matte; but the freight charges to market amounted to some \$23.40 per ton.

Cost of Shipping and Refining Bullion and Matte.

Value of material \$200 per ton, half gold, half silver. Gold estimated at \$20 per ounce; silver at \$1. No allowance made for loss in handling lead.

	Bullion.	Matte.
Gold .....	\$100 00	\$100 00
Silver .....	97 00	95 00
Total .....	\$197 00	\$195 00
Less freight and treatment .....	\$23 40	\$1 50
Total proceeds of one ton .....	\$173 60	\$173 50

Showing a margin of \$4.90 in favor of the matte. Owing to the low grade of material which is aimed at by the matting process it is hardly probable that a matte will be produced in one operation carrying over \$200 per ton. However, if circumstances should demand a concentrated product, the first matte could be partially roasted and melted again with siliceous ores, putting the slag resulting from the operation (which would probably be too high to throw away) back into the first smelting.

Since writing the above, I have seen Mr. E. Gylben Spilsbury's paper on

Experiments in Matting Iron Sulphides.

Mr. Spilsbury has been misinformed in regard to my own work to which he refers. We never purchased any copper ore at Toston, nor have we purchased lead ore during the past two years. Our best results were obtained when running on pyrites alone, with just enough siliceous material mixed with them to insure a proper slag. Our pyritic ore, although not requiring concentration, occupy a fissure in solid diorite (?), averaging about 30 inches in width, and are so broken up in mining that 50 per cent has to be sent to the caloner and roasted, the material being afterward mixed with lime and "bricked" preparatory to being put through the last furnace. The failure of the gold to concentrate in the matte in the Boston experiments referred to by Mr. Spilsbury might have been due to the absence of any metal with which the gold could associate itself. In the Toston experiments, besides a little lead which usually separated out in the metallic state, the matte contained silver in varying amounts from 20 ounces per ton upward. That the gold could not be kept out of the slags at Boston, might also be accounted for by the low heat to which the charge was subjected. This difference between the results obtained from a blast-furnace and those from laboratory experiments can be in a measure anticipated. I do not recall any slag made at Toston which carried as high as 0.2 ounces gold per ton, and the average was below 0.05 ounce. We estimate that at Toston we can handle \$13 gold ores by themselves without loss, but when mixed with dry ores at ruling prices we can treat such gold ores at a profit. This includes mining and hauling 12 miles, the use of coke at \$19 per ton, and the shipment of the matte half across the continent for further treatment. Of course, with facilities for wet concentration, a much lower grade of material can be handled.

TABLE SHOWING THE VALUE OF ORES TREATED BY PYRITIC SMELTING IN OTHER COUNTRIES.

At Lond, in Austria—Average value of the ore treated in 1886:	
Gold .....	0.117 ozs. per ton.
Silver .....	0.915 ozs. per ton.
Copper .....	2 per cent.
Lead .....	1 per cent.

At Kongberg, Norway—Average value of ore treated: silver, 6.71-35 ounces per ton.

At Talathan, Transylvania—Average value of ore treated: 9.65 ounces auriferous silver per ton.

In the Altai Mountains, Prussia—Average value of ore: 14.58-17.5 ounces of silver per ton.

In Lower Hungary—Average value of ores treated: 17.50 ounces silver per ton.

At Lala, in Sweden—Average value of ore treated by this process: 8.46 ounces of silver per ton.

(To be Continued.)

SHASTA COUNTY is said to contain one of the best chrome mines in the world. It is located on Shotgun creek, on the railroad, not far from Sims Station.

A Flowing Well.

Artesian wells are proving such an important factor in agricultural production in some parts of the State, and promise so much more in the development of our arid regions, that it is appropriate that we should give prominent place to an engraving of a flowing well with the latest improved appliances for directing and regulating its flow. The engraving is made for the PRESS from a photograph of a well in Miramonte Colony, in Kern county, and though the engraving may have few artistic features, it has the superior advantage of truth to nature in its representation.

It will be interesting for the casual reader or for those who have not given much attention to the subject to mention a few general facts in connection with artesian wells in California. Probably the oldest large group of wells in the State are those of the lowlands of the Santa Clara valley, where small fruits and vegetables have been grown with artesian water for a generation. The lowlands of Los Angeles county follow in point of time, and yet it is a score of years since three in the neighborhood of Anaheim became famous. Within the last 10 years wells have been bored singly or in groups in large numbers in nearly all parts of the State, and though there have been instances of exceeding depth of penetration and high expenditure without much aqueous return, it is safe to say that as a rule California artesian

now common, while two and four inch was the earlier size.

The upper San Joaquin is an ideal region for well-boring, as no rock tools are required. The bore encounters layers of sand and clay, sometimes well compacted, but still easily penetrated. The usual rates for well-boring in this region are given as follows: For the first 100 feet, \$50; for the second 100 feet, \$75; for the third 100 feet, \$100, and a proportionate increase for each 100 feet. The casing ordinarily costs from 35 to 50 cents per foot, and the owner of a well is expected to board three men while the work is being done, which takes from three to five weeks, according to the number of accidents that happen during the work, these accidents arising mainly from quicksand choking the pipe and the jamming of the casing.

As might be expected, the lower levels yield the cheapest and the best flowing wells. Mr. Raymond, whom we have just cited, says the artesian district of the San Joaquin valley may be defined by the line of 300 feet elevation. This line "curves in and out around the valley, and nearly incloses its greatest area." Many wells bored above this elevation have not been flowing wells, but have to be pumped. There are, of course, exceptions, and flowing wells have been secured at a higher point, but these are believed to have struck the flow from a natural reservoir higher than that which feeds most of the valley wells.

Our engraving shows a well in the Miramonte colony, and is typical of the best flowing wells.

Mechanics' Institute.

At the annual meeting of the Mechanics' Institute the report of Hnree Wilson, the librarian, for the year ending February 29, 1888, showed that the receipts from members' fees and dues were \$2276 in excess of those of the previous year. There are 2982 paying members in good standing, 167 life members, and 11 honorary members. The gain in membership during the year was 308. The present number of volumes in the library is 45,051, a net increase during the year of 3586. The percentage of missing books has been greatly reduced. The loss is largely from the fiction class, and is believed to be principally the result of carelessness rather than of intention. Frequently, however, valuable books are missing from the reference department, and valuable books are sometimes mutilated in order to obtain brief articles or drawings. There is no apparent remedy for these evils, though careful supervision is exercised. It is encouraging, however, to note that the perpetrators of these depredations have occasional spasms of conscience. Recently several valuable books, missing for years, have surreptitiously reappeared upon the shelves, and once consciences money was sent the librarian by mail. The gifts to the library were 411 bound volumes and 302 unbound volumes and pamphlets.

The constantly growing work of the library makes it necessary to ask for relief from crowded shelves and restricted premises. This matter, it is understood, is receiving the attention of the board of trustees.

The treasurer's report showed a balance in the library fund of \$3558.23. The pavilion fund showed a balance of \$361.89, and the balance in the sinking fund is \$403.34.

The president in his report summarized the year's work, and showed that last year was one of the brightest in the history of the institute. In every department there has been progress, and he was pleased to be able to say he had no drawbacks to bring to the attention of the members.

His reports of the officers were ordered printed for the use of the members. A vote of thanks to the president for his able and faithful services was proposed by W. T. Garratt and carried unanimously. The trustees who were elected at a recent meeting were installed by W. T. Garratt.

Working Tailings.

The ancient fortune-teller who confidently predicted that by the time the Chollar mill started \$4000 would course and tingle down Six-mile canyon daily, inviting 500 miners, and sluicers and millmen to pick them out of the mud, has changed his tune. He now says that owing to the fact that the mills get a far larger percentage of the assay value of the ore, etc., the owners of blanket sluices in Six-mile canyon maintain that they can barely make miners' wages. When things prospective bore their most roseate appearance, an *Enterprise* reporter took a spin down Six-mile canyon and interviewed every sluice-trotter from the head of the canyon down to its mouth, and showed beyond all cavil that the canyon could cackle if it ever afforded remunerative employment for 100 men. The sluicers down the canyon, who have caught tailings in reservoirs, claim that their best assays don't exceed \$1.40 per ton. The millmen themselves claim to work their ores so fine that the tailings escaping don't assay more than \$1.65 per ton. From the above facts it is easy to figure all that goes down the canyon. The California mill works about 340 tons daily, and the Chollar mill 70 tons, making 410 tons. Multiply this by \$1.65 and you have \$676.50 rolling down the canyon daily. There is not a man on the lode who knows the difference between a quartz-mill and an apothecary's mug who claims that the sulphurets saved in the sluices can be worked to over 50 per cent of their assay value. This reduces the value of the daily escape of wealth down Six-mile canyon to \$338.75. Times are not yet sufficiently down on the Comstock to induce 500 men to cut each other's throats for this sum of money. Every man working at sluicing down the canyon to-day is on the lookout for a \$4-a-day job, and as the world goes, is jealous of those who have them.—*Virginia Enterprise*.

THE California Bridge Company has been awarded a contract by the City Council of Santa Cruz for a new iron bridge across the San Lorenzo river. The new bridge will extend Riverside avenue to the beach, making another thoroughfare from the center of the town to the bathing-grounds.

PHOTOGRAPHIC VIEW OF FLOWING WELL IN THE MIRAMONTE COLONY IN KERN COUNTY.

wells are comparatively shallow, very cheap and exceedingly profitable, in many cases yielding their horers in actual value of water and enhanced value of real estate hundreds of times the expenditures required to secure them. We have not time to review the wells of the State; an interesting volume could be written on the subject. Perhaps the most famous artesian localities developed during the last decade are the San Bernardino valley, including the new Gees wells for the irrigation of an extension of Riverside, the Ontario and Pomona well, and others in Los Angeles county, the vast artesian districts of the San Joaquin valley and the interesting mountain artesian district of Sierra county. Besides these there are gas wells, oil wells and water wells here and there which an antiquer would describe as too numerous to mention.

As the well shown in the engraving is located in the rapidly developing region of the upper San Joaquin valley, it will be proper to speak especially at this time of that neighborhood. A few years ago we gave a map of the artesian wells of Tulare county, and we have given enumerations since then, but the well-borers work so fast, and the land-owners like flowing water so well, that any enumeration rapidly becomes old. A writer in the *Chronicle* last week apparently, after considerable research, gives the number of wells in the San Joaquin valley at 350, with a flow of 100,000,000 gallons every 24 hours. Of these Tulare county claims, according to the *Valley Record*, 120 wells flowing upward of 25,000,000 gallons each 24 hours. Kern county, according to a recent enumeration by Mr. George A. Raymond, had 41 wells with a daily flow of 48,000,000 gallons. Mr. Raymond has taken the utmost pains to verify his estimate of the flow of these wells in Kern county. The fact that fewer wells in Kern yield more than a larger number in Tulare is accounted for by the fact that the Kern wells are all of recent boring, and a much larger diameter is now secured than was sought for in the earlier Tulare borings. Ten-inch wells are

The arrangements for capping is that shown in detail, with sectional drawings in the PRESS of Sept. 24, 1887. It has an anchor underground which securely holds on the capping device, and thus by turning the valve, which the man is represented as doing in the picture, the flow may be stopped or regulated at any point from zero to a full flow. There is a law that all wells shall be capped when the water is not in use, and this should be done for two reasons—first, because it has been shown that artesian streams can be diminished by excessive draught upon them, and second, that water-soaked soil is not desirable either from a producing or sanitary point of view.

The effect of artesian wells is to rapidly develop the region in which they are obtained. Such is the fact in Tulare county. Kern county also is being enriched by a number of colony enterprises and the incoming of large numbers of colonists. Besides the Miramonte colony, one of whose wells we show, there is another enterprise, the Smyrna colony, which has a well with a daily flow of 2,000,000 gallons and many more in prospect. These wells and the enterprises based upon them bid fair to transform a vast arid region into thickly settled and prosperous communities.

THE COPPER TRUST CLOSING IN.—The New York *Post* says that for the past three weeks M. Secretan, head of the French syndicate which has been cornering copper, has been in London, and has finally concluded arrangements which put the copper supply of the world in control of the company of which he is the representative. He has previously secured the whole product of the Rio Tinto, Tharsis, and Mason and Barry mines in Spain, which produced nearly all the copper mined in Europe, the Cilumet and Hecla, Anaconda, and others in this country, and the only thing left for him to do was to secure the co-operation of English smelters. This done, he had only to set the price for copper and it could be maintained without difficulty.





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SAN FRANCISCO

Saturday Morning, March 24, 1888

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## Passing Events.

The outrage at the Providence mine has aroused great excitement at Nevada City, and active steps are being taken to find out the men who placed the dynamite in the pipes. It is naturally concluded that the attempt to destroy the property of the company was owing to the miners' wages question.

The United States Supreme Court has decided that the Bell telephone patent is a valid one. The case has been some time pending and involved millions of dollars.

Attention is again being turned to the iron mines of Oregon, and new furnaces have been built. No doubt that the iron resources of that State will be more fully developed from this time on.

The people of Deadwood, Dakota, have raised by subscription \$40,000 of the \$60,000 required to put up the new reduction works at that place.

The murder of Mr. Cyrus Gribble, superintendent of the Vulture mine, Arizona, while carrying bullion to town, removes a skillful mining man, and one highly respected by all who knew him.

## Work for Government Engineers.

A bill has been introduced in Congress providing for the appointment by the Government of a commission of engineers to examine and report on the mining debris question in California. As the services of this commission, if appointed, will be attended with no expense to either the farmers, the miners or others more immediately interested in the adjustment of this much-vexed question, we can see no good reason why it should meet with opposition in any quarter.

Yet that portion of the newspaper press that represents the farming interest in the localities affected, objects to the appointment of any such commission on the ground that this matter having been passed upon by our home judiciary, ought to be considered settled, and finally disposed of. The hydraulic miners, say these papers, having, after a full investigation of the case by the courts, been enjoined from further operations, ought not now to be granted a rehearing, nor should the Government itself presume to seek additional information on the subject. The miners, on the other hand, are not only willing but anxious that the proposed commission shall be appointed and that the members shall enter upon the performance of the work to be assigned them at once.

Why any one should oppose the action here contemplated to be taken is what we fail to understand. If this corps of engineers shall accomplish no good, they will certainly do no harm. Possessing no judicial powers, they cannot remove the injunctions issued by the courts or otherwise interfere with the action taken by them. The findings of these courts will stand as they are until reversed by some higher tribunal or modified by Act of Congress. The status of the whole business will remain as it is, be the report of the commission what it may. Why then should the anti-debris people or their organs object to this commission being instituted and going on with its work, which will consist in ascertaining and presenting the facts as they find them?

This question of filling up the navigable rivers and waters of the State is one of general concernment. It is not confined to the parties to this controversy. The whole country is interested in the subject. If navigation has been impeded by the mining debris to a troublesome extent, it is Congress that will have to provide the remedy, and that body may not feel like voting the money required for such purpose without additional information on the subject, and more especially of information derived through thoroughly competent and disinterested channels, that already obtained having been more or less warped by interest or colored by local sympathy, friendship or prejudice. From this sort of bias a corps of Government engineers would be wholly exempt. Being strangers to all concerned, knowing neither friends nor clients, they would be little influenced by that bias which is apt to create in the heat of men a leaning toward the side of their employers. As the expenditure of large sums may be necessary in dealing with these obstacles to navigation, it is only reasonable that Congress should desire to obtain data through independent sources of information.

Again, the General Government is interested to maintain our output of gold at as high a figure as possible. Now, as is well known, that output has been diminished by the closing of the hydraulic mines to the extent of several millions annually. If, by any means, this production could be restored, or partially so, the public good requires that it should be done. Of all the world's wants, that of more gold comes the nearest to being universal. Now, it may well happen that this body of trained engineers, having ample time and opportunity to examine the conditions, will be able to suggest means whereby hydraulic operations may be in large part resumed without detriment to any important interest. But should they fail to do so, no one would be damaged thereby. The case of the miners would be no worse, while that of their opponents would be improved. So far as mere sentiment goes, all would be better satisfied—the miners, because they would feel that they had been fairly and impartially dealt with, and the farmers, because of the great gain it would be to their side.

Whatever the conclusions reached by these experts, they would be generally accepted as ending the controversy now being waged be-

tween the hydraulic miners and the owners of the valley lands. Though adverse to them, these conclusions would be apt to meet with general acquiescence on the part of the miners, who would then very likely give up the fight and submit to the inevitable.

As matters now stand, the miners and their friends feel deeply aggrieved, and, although these parties have everywhere submitted to the decrees of the courts, the smoldering embers of discontent are liable at any moment to break out. It would be worth a good deal to the country to have this spirit of discontent allayed and this very troublesome question put to rest, even at the expense of some injustice done the miners.

## Sacramento River Placers.

It may be a surprise to many to learn that active steps are being taken to mine again on the upper Sacramento in localities where the pioneer miners of the State took out considerable gold. Within the past few months claims have been taken up for 15 or 16 miles along the river. Many of the creeks, ravines, and gulches emptying into the river have yielded great wealth. Among these may be mentioned Middle creek, Rock creek, Jenny creek, Gold Run. Wing-dams were built in early days, and as much of the bed mined as could be reached by this method. Although the bed was found to be "spotted," fair pay was generally made. Still it has always been recognized that could the river-bed be laid bare for any distance, large amounts of gold could be secured. What lies in the main stream has been probably washed in from the side creeks and ravines. Vast deposits of gravel, boulders, etc., have been washed down for ages from sections of country that have yielded their millions, so that it is not unlikely that large quantities have been washed into the river.

Recently a company has been formed called the Redding Sacramento River Placer Co., and they intend to prosecute work. It is expected that a dam will be built by the Shasta Water Company to obtain water for irrigation and manufacturing purposes, and below this it will then be possible to do some mining. A well-known gentleman of this city has been investigating this question, and he has interviewed men who have worked claims for 20 years along the river, and they state that it has been found very rich in several places. One man has been working by getting up what he could from the bottom with a long-handled shovel, taking out from 10 to 50 cents at a time on the shovel in some places. Wing-dams have been built for miles wherever the water was shoal enough to do such work in. During this gentleman's observations he has taken moss from the rocks and found gold in it, the moss acting as a blanket in catching fine gold.

A good deal of the ground along the sides of the river has been worked over and over again. After a dam has been put in the river will be to a great extent bare. On the banks near the river in some places river men are making from \$7 to \$10 per day to each rocker, or from \$3 to \$5 per day to the hand. One man sunk 80 feet and found wash gold, and is now going to drift the ground. Clear, Middle and Rock creeks are still being mined. It is probable that quite extended operations will be carried on before long where the new claims have been taken up on the river.

THEY have stopped boring in the well on Mrs. Langtry's land near Carson, where some ore was found. The quartz found later contained no silver, and those who made other locations near by are much disappointed. The last 12 feet was in very tough clay, and the hole being very small, the clay stuck to the sides of the drill and progress was not only very slow, but got slower every foot in drilling. Two heavy stringers of quartz were passed through and one wall of slate 20 feet thick, and work was stopped in clay.

THE owner of the Metropolitan foundry on Townsend street, near Third, has had to pay \$500 damages because the smokestack was so short that the smoke was a nuisance to tenants of adjoining buildings.

COAST coals for home use are now in better supply, but foreign grades are still scarce. It is expected that present prices for coal will be sustained for some months to come.

## Mines in the Southern States.

George E. Mills, who has been connected with mining matters on this coast for many years, has for the past five years been engaged in mining operations in Georgia, Alabama, Virginia and South and North Carolina. He has come back to San Francisco again and declares that any man who leaves this State to go to mining in the South ought to get six months in jail for being such a fool. He says good miners, and plenty of them, are to be found in Georgia and North Carolina who will work for 75 cents a day. Alabama is enabled to deliver iron out of the furnace at Birmingham for \$850 per ton, though it is not as good as the Pennsylvania iron. He counts the five years spent among the Southern mines as five years lost, for he never worked so hard to get so little money. Some of the gold ore in Georgia, which is generally very soft, will pay if worth only 75 cents per ton; and with men who will mine at 75 cents a day, and split cordwood for 35 cents a cord, they get their labor cheap enough. The mills they use are of the California pattern. There are two English companies mining in Montgomery county, Alabama, and one St. Louis Company is about opening a gold mine where the ore is only worth 40 cents a ton, but Mr. Mills can't see any profit in the speculation.

He says a number of Californians have gone to the Southern mines, but they do not stay. There are many better chances in this State, but Northern capitalists have been going down there and investing instead of coming here for gold mines. He met a number of old California mining superintendents in New York and thereabout, but most of them are sorry they ever left here. Mr. Mills says this coast is good enough for him, and he proposes to stick to the mines out here after this.

## Oregon Iron.

Although at one time it was expected that the Clipper Gap mines in California would continue to produce iron for many years, the unfortunate litigation, the disastrous fire, and other circumstances, combined to put a stop to the whole operation. This was the only attempt ever made on a large scale to make iron in this State, and the results were not such as to encourage others to make another trial. In Oregon, also, they did not have very good luck at the iron business, and the mines there have done little for some time.

Recently, however, active operations have been resumed by the Oregon Iron and Steel Co. at Oswego, and the company now has 175 white men and 150 Chinamen employed. The new furnace, 80 feet in height, with three ovens, 50 feet in height and 22 feet in diameter, for heating air for the furnace; the chimney, 160 feet high—all of firebrick and covered with quarter-inch boiler iron—and the brick hoisting tower, 80 feet high, are completed, and the foundry, engine-rooms, etc., are well along. The material is on the ground and the foundation ready for a foundry for casting iron pipe.

Work is begun on the stockhouse, which will contain a crusher and bins for 5000 tons of ore and 3000 tons of limestone. One hundred and seventy-five thousand dollars has already been expended and \$150,000 more will be required to complete the works now planned. The company is opening a new mine 800 feet south of the old one. Owing to delays in receiving machinery and material from the East, the furnace and pipe foundry will not be in operation before July 1st.

THE Supreme Court has affirmed the decision of the lower court in the case of Joseph Byrne, executor, vs. Julia S. Reed et al. The action was brought to remove an alleged cloud on the plaintiff's title to certain mining claims situated near Iowa Hill, in Placer county. A demand for a new trial on the ground of the discovery of new evidence had been denied, and this denial the Supreme Court now sustains.

SENATOR STEWART has introduced a bill relating to the depositing of gold and silver bullion at the mints or assay offices of the United States. It is intended as an amendment to Beck's bill, which provides for the retirement of the United States legal tender and national bank notes of small denominations and for the issue of coin certificates in lieu of gold and silver certificates.



Academy of Sciences.

At the last meeting of the California Academy of Sciences, President Harkness stated that J. L. Young of Tahiti, at the request of J. Z. Thayer, had collected 45 varieties of fish, three specimens of crustacea, and one specimen of mollusk for the academy. These had been received from the island by Mr. Thayer, and were now presented by him to the society. In describing the fish Mr. Thayer said they came from the island of Tahiti, the coral-formed harbor of which abounded with hundreds of varieties of fish. The fish are of all the colors of the rainbow, and with the naked eyes can be plainly seen disporting themselves among the coral sprays and seaweed, many fathoms deep. Near the coral reefs the fish feed, and there the natives catch them.

Mrs. Mary K. Curran read a paper on "Comparison of the Floras of California and Chili." She said that Chili possesses a similar climate, though naturally its seasons are the direct opposite of ours. The unbroken coast line would at first glance seem to account in some measure for very numerous genera and species, either identical or closely related in the two countries. This line, however, leads through the tropics, where all our species and most of the genera disappear. Accepting, as most of us do, the Darwinian theory of the origin of the species, we can hardly bring ourselves to believe that in such widely separated districts parallel lines of evolution have resulted in the production of many identical or closely related species. The intervening tropics dispose very effectually of any possibility of progressive invasion. There remains to us the theory of communications. It has been the custom for some time to attribute the presence of certain plants along the coast to introduction in the wool of sheep, to cargoes of wheat and the hulls of ships. This brings us to the particular inquiry in which we are at present concerned, how did these plants scatter themselves in former ages? We shall have to interrogate the meteorologist, and ask him for a chart of the currents of air, the course and extent of great storms, the possibility of one little frolicsome wind after another carrying seeds and even plants in their course. We must learn also the length of time vitality remains in different seeds, when immersed in sea water, and the course of ocean currents. We must ask the migratory birds what seeds they carry adhering to their feathers or buried in their soft down. When these questions are satisfactorily answered we shall have made a fair beginning in our search.

Mrs. Curran then, by means of eight cards of mounted specimens, described in a technical manner the wonderful similarity of Californian and Chilean flora, and concluded her paper by saying: "In making this short notice I have wished to call the attention of botanists to the danger of naming species here without due consideration of such as may be found in other parts of the world, but particularly Chili. There are many persons who believe, or at least act as if they believe, that two plants or two insects found a few hundred miles apart are necessarily distinct."

By the recent decision of Secretary Vilas, the litigation over the San Chiquito rancho in Monterey county has come to an end, and the property is confirmed to Emory and Bassett. The present settlers upon the land had signed an agreement some time ago with the claimants by which they will now be allowed to purchase the lands at \$1.25 an acre. The coal mine and all mineral-bearing sections were reserved from this agreement, and the mine will now probably be thoroughly tested.

It is believed the Coal Mining Act before the British Columbia Legislature will not pass because of the feature proscribing Chinese from working in the mines. The Knights of Labor, it is asserted, threaten to tie up the mines by a strike if that clause is not included in the bill, and considerable anxiety is occasioned over the possible rise in coal if the threats of the miners are carried out.

The receipts of the Potosi mine last year were \$181,000, and disbursements \$209,216, but the mine is now producing bullion at a profit.

SAVAGE is expected to pay dividends very soon, as it is now producing about \$200,000 a month.

Mining Accidents.

By the explosion in the dry-house at the Empire mine, Nevada county, last week, S. O. Trebilcock and Wm. Sheils were both killed. There were six others injured.

Eli Daise was killed last week at the Angels mine, Calaveras county, by a rock falling upon him from the roof of the slope.

Wm. McFall, who worked in the Mt. Tmolus mine, Calaveras county, had his hand crushed last week while oiling the pump in the shaft.

John Holland and Stephen Williams were badly injured in the West Celusa mine, Meaderville, M. T., last week. By a mistake of the engineer in releasing the engine clutch, instead of putting on the brake, the cage, with the men in it, was dropped 225 feet. The men were seriously hurt, but not killed.

A sensational escape from death is reported

DYNAMITE AT THE PROVIDENCE WORKS.—On Friday night of last week a heavy blast was heard at Nevada City, and it was found that the pipe leading to the Providence mill had blown up. An attempt had been made the day before to blow up the mill. The bomb which exploded had been put into the water pipe and was intended to reach the Providence, but it exploded near the Champion shaft before reaching the former mine. Torrents of water, under a strong pressure, went pouring into the Champion shaft, carrying tons of debris with it. The attempt to injure the Providence Company no doubt originated from the decision of the company not to pay \$3 a day for wages as heretofore. Citizens of Nevada City have held an indignation meeting and are endeavoring to find out the perpetrators of the outrage.

F. M. Smith, who is manager of the borax companies of the coast, has gone to Washington

Wickes' New Gang-Mill.

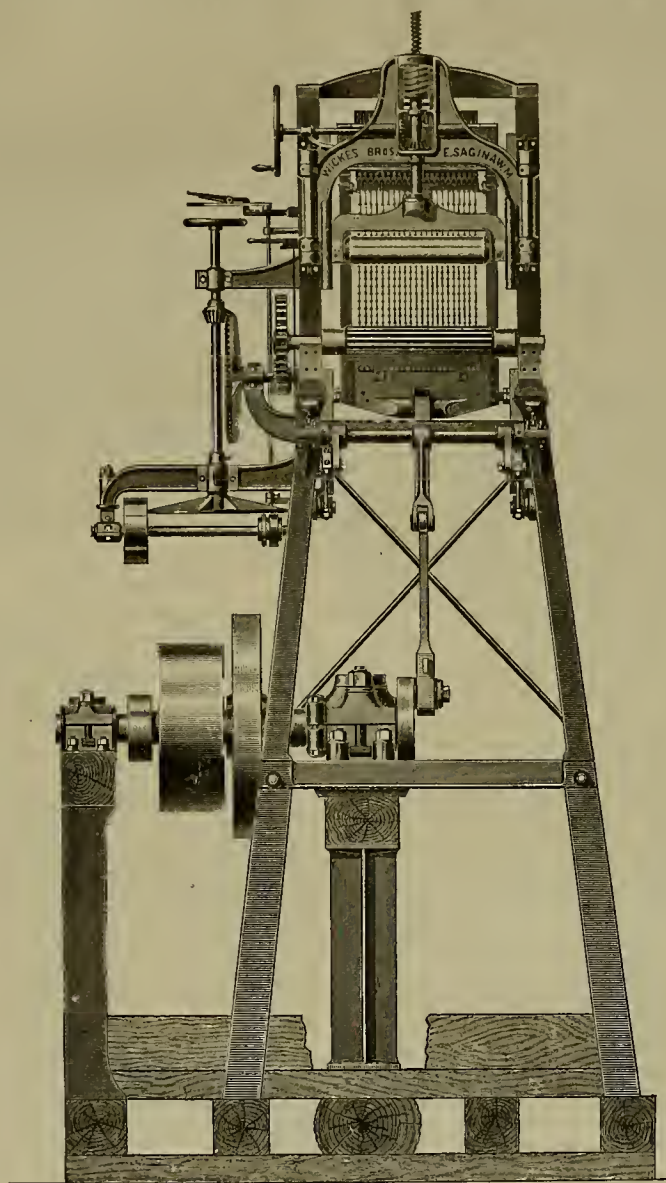
The requirements in the general construction of the gang-mill as to strength and proportion of parts, kind and quality of material, are now so well known that a machine such as that illustrated herewith meets with prompt appreciation. A mechanism, simple and effective, to produce the easiest-cutting saws possible, is an important feature obtained in this new machine.

The mill is designed and termed by the builders as their No. 3 gang, and brought out to meet this demand for a smaller class of mills, retaining the valuable features of their former build, at the same time making it practical to simplify its parts and reduce its cost both in the machine itself and manner and mode of setting. The main or valuable features of this machine are outlined by its makers as follows:

First, simplicity; second, strength of parts, insuring great durability; third, a simple and effective oscillating movement, which presents the saw to the timber in such a manner as to cut under or against the grain during the entire half stroke, at the same time giving a perfect working in the up stroke, producing the easiest possible cut of saw, admitting the use of the thinnest blades with success. This plan also does away with all eccentric and crank motion to operate it, greatly reducing friction and the wearing of parts without adding extra weight to the shaft.

The extension of the iron frame through to the bottom of the foundation admits of its inclosure and forms a simple and substantial base or foundation at much less cost than is possible in the larger machines. This inclosed base is filled in with any weighty material, such as gravel and cement, clay, brick, etc., giving this weight necessary for anchorage, while the main crank shaft and pillow blocks are given support and solidity by the heavy iron columns reaching down to and resting the main anchor timbers below. The main pillow-block bolts reach down and bind the whole firmly together.

The main shaft is 8 inches in diameter, with crank and pin all forged as one piece, giving the greatest strength possible with a stroke of 14 inches. The main pillow block is especially strong and heavy. The main pitman of the new design is of great strength, and adapted to high speeds with safety. The framework or hales, containing press rolls, are so arranged upon hinges as to swing out and away from the saws, so that the work of hanging in the saws will be entirely unobstructed. H. P. Gregory & Co. are the agents for the Pacific Coast.



NEW IRON-FRAME GANG MILL.

from Ballarat. Michael and John Cullinan were sinking in the Young Sullivan Company's mine at a depth of 275 feet. They used an ordinary miners' bucket, with a "tail" rope attached. The signal was given to draw the bucket up, when Michael discovered that his ankle was entangled in the tail rope. His brother, in trying to release him, got his wrist caught between the rope and his brother's foot, and the two men were drawn to the surface, one being suspended by the wrist and the other by the ankle. Both were suffering intense agony. At about 50 feet from the surface the brakeman heard their cries and he stopped the engine, and they were thus suspended over the shaft 200 feet deep. Ascertaining the nature of the occurrence, the brakeman soon had them at the surface and released them from jeopardy.

The local iron market is very firm, and pig iron for shipment has advanced. Lead, copper, tin, zinc and spelter are also very strong. Stocks of tinplate are light. Quicksilver is quiet but no lower.

to endeavor to convince the legislators that the duty on borax and boracic acid should be maintained. In both the Randall and Mills hills cruds horax is placed upon the free list. Randall protects refined borax and boracic acid, with a slight reduction from the present rates, while the Mills bill makes all borax and boracic acid free. William Tillman, who is largely interested in the industry, obtains crude borax from Death Valley and San Bernardino and Inyo counties and from Esmeralda county, Nevada. Mr. Smith says if the duty on crude borax is removed, Congress might as well remove the duty on all the products of borax and the manufacturers in the United States would have to abandon the business. About \$1,000,000 is invested in the industry in California.

JUDGE FINLETTER of Philadelphia has ordered that Keely must show his motor. The plaintiff who secures the decision is Bennett Wilson, who has had a half-interest in the motor since 1869, but has been unable to inspect the invention.

MINING SUPERINTENDENT MURDERED.—Cyrus Gribble, superintendent of the Vulture mine, Arizona, and a young man named Johnson who accompanied him, were murdered while on their way from the mine to Phoenix with the bullion from the mine. The bodies were found near Nigger Wells, 32 miles from Phoenix. The express company some time since discontinued their office at Vultures, owing to robberies on the route. The men who murdered Mr. Gribble and Mr. Johnson stole the \$7000 in bullion that was in the buggy. The mine belongs to ex Senator Tabor of Colorado, and he has offered \$1000 reward for the arrest of the robbers and \$1000 for the recovery of the bullion. As this item is penned a letter lies on the writer's desk which was received from Mr. Gribble a few days since politely thanking the editor for some information furnished at his request. He was well known in Colorado, Australia and on the west coast of Africa, where he has been conducting gold-mining operations. He returned a short time since from a trip to London.

Since writing the above the telegraph informs us that Charles Doolittle was also murdered at the same time.

THE Hals and Norcross mines last year milled 3948 tons of ore which yielded \$119,760, of which \$55,817 was gold and the balance silver. From the several levels they hoisted last year 58,000 tons of waste, and ran 9233 feet of drifts. From the ore in the uprais in the north lateral drift they are now taking out 200 tons of good ore daily.

A NUMBER of miners were discharged from the Pittsburgh mill at Tinsboro last week because considerable amalgam was missing during their shift.



## MECHANICAL PROGRESS.

## The Intelligent Mechanic's Labor.

A group of gentlemen were discussing the necessity of brain labor in some life vocations, and after a lusion had been made to several well-known citizens who were successful and prominent in their professions, one of the speakers, himself a retired merchant and influential politician, declared that Blank, naming a draftsman and inventor employed in a large machine-tool manufactory, did more brain labor than any other man in the city. Some examples were cited of well-known mechanics, and the conclusion was reached that intelligent mechanical labor required as much solid thinking as any other way.

The intelligent, valuable mechanic is not a mere walking machine; materials are not always plastic; they are sometimes perverse, and judgment and calm consideration are required in their management. The parts of a machine, however closely planned, do not come together unaided and naturally, as eyesores converge in a saucer of vinegar; it requires headwork to "assemble" the parts of a machine of any kind, and nowadays, when mechanical work requires an accuracy of proportions and a nicety of dimensions such as were not dreamed of a generation ago, the mechanic who is not brainy in his line will surely get left.

The mechanic who thinks he has arrived at perfection may be written down as an ass. There is no such thing as "perfection" in the mechanical arts, and the man who claims to be a complete and finished mechanic knows in his heart he claims that which does not belong to him, and he will soon discover that his vanity, or his fraudulent pretenses, do not deceive the employer to any great extent. Blow and bluster will not make good work, or pass for efficiency, and the man who uses those sort of weapons seldom deceives an employer. "I never employ a man who knows it all," said a large contractor. "Give me a modest, neat-looking man," he continued, "and I'll hold you a dollar he is a good workman, and one that may be relied upon, though, of course, that sort of man seldom comes in search of employment. Braggings fellows, who state they can do anything, from dressing a board to designing and building a cathedral, are quite numerous, and may be had at any moment." Doubtless that is true, but it does not argue that there are not many of the modest workmen. There are plenty of them, good, reliable fellows—fellows that seldom or never have need to seek employment. They are always engaged. Most of them own their homes, are intelligent chaps, models in their own neighborhood, the best of citizens, have neat, thrifty wives and healthy, happy children, and their country is proud of them, for it understands that they are towers of strength and bulwarks of true freedom. It is not from this class anarchists or noisy demagogues are drawn; they do nothing until they have first considered the results, and all their actions are tempered with wisdom; hence their ability to become good mechanics.—*Exchange.*

"PURE" STEEL.—When steel is subjected, as in a fire-box, to sudden and great changes of temperature, the tendency to crystallize and crack is in direct proportion to the quantity of impurities present. If the steel has nothing in it but pure iron and carbon, it might be heated and cooled almost indefinitely without changing its structure. Phosphorus is by all odds the greater enemy of steel, especially if the latter be subjected, as in a fire box, to the extreme limits of temperature that accompany heating and cooling. Its vicious tendency is enhanced by heating and cooling, and it exercises a greater influence than all the other impurities together. Silicon, if as low as .015 or .02, and manganese, as low as .35, have apparently no influence for good or evil practically; sulphur is never present in good boiler steel. Surface finish or great smoothness in boiler steel is no criterion that its quality is good. In fact, if the manganese be almost entirely eliminated, pitting is sure to occur under the process of rolling. A pitted sheet, therefore, indicates pure steel.—*National Car-Builders.*

THE SAFETY LIMIT FOR BELTING.—Those who have the practical management of factories will find the following of value. It is a settled fact in mechanics that no piece of machinery, whether it be a belt, shaft, or gear, should ever be submitted to a strain greater than one-half of its breaking strength; it follows that a belt to be lasting and durable should not be submitted to a strain greater than 100 pounds to the inch in width. It is also an established fact that a leather belt passing over the face of a turned cast-iron pulley embracing one-half of its circumference, will give a fractional force equal to 40 per cent of the stress, so that if a belt one inch wide is passed over the face of an iron pulley embracing one-half of its circumference, and subject to a stress of 100 pounds, the fractional or driving power will be 40 pounds. If this force of 40 pounds is carried forward at a speed of 1000 feet per minute, it is evident that this force will be equal to 40,000 pounds at one foot per minute.

HITTING THE ANVIL.—A writer in the *Manufacturers' Gazette* writes upon the blacksmith's habit of hitting the anvil while at work as follows: Some time ago I read a short article con-

demning this peculiarity of blacksmiths in general. I showed it to a friend of mine, an expert in the trade, asking his opinion of the article. He explained to me that a blacksmith, in striking the anvil, when working alone, did so to rest his hand. Also it enabled him to think if he had time to look at the work a second or so between blows. Aside from this the habit admits of changing the position of the hammer-handle in his hands, and withal is a great relief to the smith. We all know how a blacksmith instructs his helper by striking on the anvil to indicate his wishes.

## Rotary Steam Engines.

The problem of getting an efficient and durable rotary engine is a most interesting one, and the peculiar advantages of great compactness and simplicity to be had in engines of this class make it a most desirable object to attain success. Most rotary engines consist of a cylindrical case or shell, inside of which revolves a smaller cylinder on a central axis or shaft; but the vital point is to have proper provision for the peripheral projections of the revolving cylinder to easily pass the abutments, against which the live steam bears to force the cylinder around.

In a recent improvement in this line, which is owned by A. W. Billings & Co. of Larned, Kan., provision is made whereby prompt and positive movement of the hinged heads or abutments is secured, so that the projections from the revolving drum can pass clear and the abutment be shut down steam-tight immediately after, so that the steam then admitted will act. There are two abutments disposed diametrically opposite, while on the steam drum there are three projections in triangular relation, so that there is not a moment of time in which there is not a full head of steam pressure in the cylinder and consequently no dead points. The positiveness of action is secured by having outside the shell, upon the shaft, a cam plate having in its plane, near the edge, a cam groove, whose conformation is at three places the arc of a regular circle, intercepted by three grooved arcs of a smaller circle. These arcs are placed in triangular relation to correspond to the three projections on the inner revolving drum, and the cam plate is keyed upon the shaft in such relation that the short arcs act upon a projecting bent stem, which extends outward from the abutment hinge and enters the cam groove. By this it will be clearly seen that the action of the parts is uniform and positive, and that there can be no knocking or wearing. The bent stem that terminates in the cam-groove plate can be applied with an anti-friction roller.

A practical rotary steam engine would be a most valuable invention and largely economize the use of steam.

AMERICA GOING AHEAD OF BRITAIN AS A PIG IRON PRODUCER.—Great Britain in 1877 produced 6,608,664 tons, and in 1886 6,870,665 tons of pig iron, an increase of 262,001 tons, equal to 3.96 per cent. The United States produced 7,187,206 tons of pig iron in 1887, which shows an increase of 145 per cent of the yield of the previous year. Germany showed an increase of 134.92 per cent; Austria-Hungary, 51.59 per cent; Belgium, 48.04 per cent; and Great Britain, 3.96 per cent. On December 31, 1886, there were 857 furnaces in the United Kingdom, and of these only 377 were in blast. This gave 480 out of blast, a number which, if employed, would have been amply sufficient to have maintained England's position with her foreign competitors. In steel this country also shows a most gratifying increase. The total output for 1887 was 3,739,760, an increase of 30 per cent over the product of 1886. Of this total all but 451,403 tons were Bessemer steel. Our production of Bessemer steel, as compared with that of England and other European countries, is alluded to by Mr. James Neilson, an English writer, who, not content with illustrating the decreased make of pig iron in England, says: "I would call the attention of the Scotch steelmasters to the world's production of Bessemer steel in the past 10 years, and would ask: 'What did they find?' In 1877 the United States produced 500,524 tons; in 1886, 2,026,062, an increase of 1,525,538 tons, equal to 304.78 per cent. Germany in 1877 produced 391,110 tons, and in 1886 1,185,000 tons, an increase of 793,890 tons, equal to 202.98 per cent. Russia, in 1877, produced 40,000 tons, and in 1886, 270,000 tons, an increase of 230,000 tons, equal to 575 per cent. Great Britain, in 1877, produced 750,000 tons, and in 1886, 1,570,256 tons, an increase of 820,256 tons, equal to 109.43 per cent."

POWDERED COAL AS FUEL.—The efforts to use powdered coal for fuel which were made on an extensive scale several years ago seem to be still exercising the minds of steam-users. A public test took place at the Cheater Rolling Mills at Chester, Penn., last week, of the device for saving fuel and improving iron invented by J. G. McCauley. The process consists of the spraying of fine coal, reduced by the Cyclone pulverizer to a powder, into a chamber attached to the furnace, in which the combustion is so perfect that all the waste hitherto occurring in smoke and ash is entirely obviated. The general result, it is stated, showed a saving of between 40 and 50 per cent of coal, a saving of 50 per cent in time of heating the furnace and a greatly improved quality of iron.

## SCIENTIFIC PROGRESS.

## What is the Soul?

The editor of the *Phrenological Journal* answers the above query put by a correspondent of that journal as follows:

If by the "soul" you mean the spiritual part of human nature, we frankly answer that we do not know. The philosophers of ages have been trying their best to unravel the mystery, but in spite of their immense tames of discussion they have not reached a definite and satisfactory conclusion, as you will see by consulting any standard work on intellectual philosophy or moral science. One of the students at the recent session of the institute, Mr. N. N. Riddell, after listening to the writer's lecture on the relation of moral faculties to the physical powers, wrote out the following opinion, which is about as near to the truth as any of us usually get when we attempt to explain the essence of the psychological attributes:

*Soul* is the eternal, all-prevailing force from God Himself.

*Life*.—Soul acting in connection with organized matter.

*Mind*.—That which is evolved from an organized brain by the action of soul on the organization.

These three qualities, soul, life and mind, constitute the immaterial man. One of the objects of this combination of soul with matter is to develop and (so far as possible) perfect an individuality, an ego. If the organization becomes unbalanced in any of the several parts, its manifestations become abnormal or diseased, and, if this disturbance be in the brain, improper manifestations of mind are the result, because brain is the organ through which the life principle manifests mind. And when this disturbance becomes sufficient to destroy the connection or combination between the vital spark or soul and the organized body, the phenomena known as life ceases; and as mind is but the result of the co-working of soul with an organized brain, it follows that when they cease action, mind, as it is known here, ceases also. Now, this individuality, this ego, that has been developed by and through the action of soul in connection with the highly organized brain, when released from its material habitation, severed from matter, still retains its individuality, and this released individuality I call spirit.

## The North Pole.

It has often been said that the desire or ambition, as it may more properly be called, to reach the North Pole will never abate so long as those who wish to engage in the enterprise can raise the means to carry out their projects, perhaps not entirely visionary, for that there is a North Pole, is beyond a doubt. The question is, after the explorer arrives there—if he ever succeeds in his venture—will he find an open sea? This is a question which perplexes Arctic navigators, and while they entertain the belief that such an open sea does exist, how are they to reach it? The many expeditions that have been fitted out to make the discovery have proved failures. Many brave men have lost their lives in the attempt; and yet this goes for nothing with those who have their hearts set upon the enterprise.

The latest adventurer in this direction, as has already been announced, is Col. Gilder, a representative of the *N. Y. Herald*. The Colonel has already had much experience in northern latitudes. He was a companion of Lieutenant Sohawka in his search for the relics of Sir John Franklin. He was also on board the Rodgers when she was destroyed by fire on the north coast of Siberia. He has had much other experience in northern research. His present plan is quite novel. He fits out no expedition, but takes passage at New London, Conn., on the northern whaler *Era*, which will land him at a point on Cumberland inlet, whence "he hopes by a bold dash to reach the most northern latitude that has yet been touched, and, if possible, plant the American standard on the point geographically known as the North Pole." The Colonel will not be hampered by any instructions whatever. He and his party will live on fish and game. If fish and game can be procured, all very well, but as there is no certainty of this, the fear will be entertained that, with all his confidence, Colonel Gilder has no greater promise than had his predecessors, who, in their explorations, practically accomplished nothing toward reaching the North Pole.

A NEW GAS.—The discovery of a new gas is reported in Germany by Dr. Theodore Curtius, who has succeeded in preparing the long-sought hydride of nitrogen, amidogen, diamide or hydrazine, as it is variously called. This remarkable body, which has hitherto baffled all attempts at isolation, is now shown to be a gas perfectly stable up to a high temperature, of a peculiar odor—differing from that of ammonia—exceedingly soluble in water, and of basic properties. In composition it is nearly identical with ammonia, both being compounds of nitrogen and hydrogen.

QUICK TRANSIT—AHEAD OF THE PNEUMATIC TUBE.—A company is being formed in Baltimore to construct an electric railway, which will, if successful, entirely revolutionize the express business and the transportation of

letters. A light elevated railroad structure, double tracked, 20 feet above ground, is projected, on which cars pointed at both ends are in run. In the center of the tracks is to be an upper rail, which will guide the cars and prevent derailment, as well as conduct the electric current which is to form the motive power. A system of automatic brakes is provided, by which the momentum of the cars will be checked as they approach their destinations. By this means it is claimed that packages can be carried from New York to Chicago in two hours.

A NEW IDEA.—A recent report of the House Naval Committee says: "We have absolutely no auto-mobile torpedoes. Our system of submarine mines or stationary torpedoes has reached a considerable degree of perfection, but a hostile fleet, protected by its armor plates from our shore batteries, could, with impunity, by means of auto-mobile torpedoes, blast its way through all such obstructions. We are, therefore, absolutely helpless against an invasion from the sea, so helpless that we should hesitate to publish the fact to the world were it not already everywhere else better known than to the people of America." The committee further says that the "United States has not now a single torpedo boat or torpedo catcher, and our Government does not now own one auto-mobile torpedo."

THE "HUM" OF THE TELEGRAPH WIRE.—Most people have noticed the incessant hum of the telegraph and telephone wire. It may always be heard by placing the ear against a telegraph post. What causes it is a matter that has never been satisfactorily explained. It is heard nearly or quite as strong in a perfect calm as in a strong wind. When secured to house-tops, these sounds are sometimes quite disagreeable; and it may be useful to know that the noise can be easily and simply stopped by a short length of india-rubber tubing fitted on the wire at its attachment. The plan was suggested by Sergeant-Major Buck, R. E., and introduced on the Southern Postal Telegraph district. Loose yarns may be used in place of the rubber tubing with very good success.

THE IMPROVED PHONOGRAPH.—Edison's new phonograph, improved in essential particulars since the original machine was supposed to be complete, is now in course of manufacture, and will soon be put on the market. It is briefly described as nothing more in principle than what is known to mechanicians as a lathe of precision turned by an electric motor. By the vibrations of a diaphragm, all sounds are distinctly repeated at the rate of 80 words a minute. It will do away largely with the service of stenographers, at least as amanuenses, and though designed for commercial and mercantile purposes chiefly, can be applied to other uses.

ELECTRIC LIGHTS IN COAL MINES.—More than 2000 electric lamps are now in use in the coal mines in England. It is many years ago that it was suggested that coal mines should be lit by electricity, but the use of portable lamps for this purpose has only recently been introduced. There is a disadvantage attending the use of incandescent lamps in mines, inasmuch as they offer no indications of the presence of fire-damp.

THE LOCOMOTIVE IN THE ARCTIC ZONE.—The first train to pass the Arctic circle passed the line on the Lulea railway recently. This most northerly railroad in the world runs up from the Swedish port of Lulea, at the head of the Gulf of Bothnia, into Swedish Lapland, within four miles of the Gellivara mountains, famous for their yield of iron ore. The works were begun 27 years ago, and then were given up until quite lately.

METALLIC PENS NOT OF MODERN INVENTION. At Acosta a Roman metal pen has been found. It is a bronze pen slit in exactly the same fashion as the present steel pen. The Dutch invented a metal pen in 1717, but it was not until many years later that the hand-screw press, which made the first cheap steel pen, came into use.

SILICUM COPPER ALLOY.—The new alloy of copper and silicium is said to be as good as gold for all purposes of ornamentation and better for many other purposes. According to the proportion of silicium in the mixture, the alloy is malleable both when heated and at ordinary temperatures. It is described as having the color of virgin gold.

IMPROVEMENT IN ROLLING SHEET IRON.—An invention has been introduced in English mills by which plate and sheet iron can be rolled perfectly level and save re-rolling for that purpose. It is a very valuable for sheet iron, which rolls crooked despite the best workmanship.

DYNAMO-ELECTRIC AND MAGNETO-MACHINE. A dynamo-electric machine furnishes a current which excites its own field magnet. A magneto-electric machine is provided with field magnets formed of permanent magnets, or with magnets excited by a current from another machine.

A MERCURY PLUMB BOB has lately been made. It consists of a small steel rod, bored out and filled with mercury to give weight.



## USEFUL INFORMATION.

**COUNTERFEIT JEWELS.**—Artificial precious stones have become an important article of trade. The products of some of the shops would almost deceive an expert, but the test of hardness is still infallible. The beautiful "French paste," from which imitation diamonds are made, is a kind of glass with a mixture of oxide of lead. The more of this latter the brighter the stone, but also the softer, and this is a serious defect. The imitation stones are now so perfectly made, and are so satisfactory to those who are not very particular, that their influence begins to be felt in the market for real stones. By careful selection of the ingredients, and skill and manipulation, the luster, color, fire and water of the choicest stones are to the eyes of the layman fully reproduced. There are few delicacies of color that cannot be perfectly given, for they depend on some undetectable peculiarities of molecular arrangement, and not on chemical composition; but the persons who buy the stones know nothing of that. Yet Sidot, a French chemist, has nearly reproduced these peculiarities, including the dichroism of the sapphire, with a composition of which the base is phosphate of lime. Two other French chemists, Fremy and Fell, have produced rubies and sapphires having the same composition with the genuine ones and nearly equal hardness.—*Popular Science Monthly.*

**CHINESE PAPER MILLS.**—There are several paper-mills at Tonquin. One is at Haoui, and produces most of the home-made paper of those regions. The hands—there are both male and female—are paid at the splendid rate of from two and one-fourth cents to five cents per day. The raw material is the bark of an indigenous tree growing in the forests. The process is most curious. The bark is steeped for some days, and then treated to a bath of milk of lime; it is next steamed in bundles during several days, after which the outer bark is cut off with knives. The mass is then beaten to pulp in stone mortars. This pulp is thrown into water made gummy by macerating therein a species of wood called go. When the pulp has lain in this water for some days, it is put into the vat. A kind of trowel or whatnot is introduced a little below the surface of the pulp, shaken about a little, and—there you are, the sheet is formed. The sheets are placed one upon another; when sufficiently drained, they are stove-dried.

**THE CHINESE WALL.**—For years the public has been treated at intervals to mathematical demonstrations of the enormous outlay of labor involved in the building of the famous Chinese wall, only to be told the next day by somebody else that there is, in reality, no such wall in existence, nothing but a few patches of a very cheap sort of earthwork faced with rock, imagination doing the rest. We have lately, however, the statement, which appears quite reliable, of an American engineer, who has made the subject a special study on the spot. He has calculated that the Chinese wall is a solid stone structure, and that it has an aggregate of 6,350,000,000 cubic feet. The material used in the construction of the wall would be sufficient to build a wall around the globe six feet high and two feet thick. The stupendous work was constructed in the comparatively short period of 20 years, an innumerable multitude of laborers being constantly, during that time, engaged upon the work.

**TEA CULTURE IN INDIA.**—The extent to which tea production is being transferred from China to India and Ceylon appears from a statement prepared by an officer of the Imperial Maritime Customs at Shanghai. The deliveries last year of China teas comprised 134,236,000 packages, which is a decrease of 23,800,000 compared with 1886-7. During the same period India teas increased to 75,425,000 packages from 48,285,000 in the previous year, and the tea product of Java more than doubled. The current year promises even more striking results. India and Ceylon enjoy the advantage of entire freedom from taxation, which operates as a strong stimulus to tea culture.

**VARIOUS WAYS.**—There are several effective means of taking out grease spots. Chloroform will do it. So will a mixture of alcohol and ammonia; or you can wet the place with ammonia water; then lay white soft paper over it, and iron with a hot iron. Or rub French chalk on the wrong side; let it remain a day, split a visiting card, lay the rough side on the spot, and pass a warm iron lightly over. Or try the old-fashioned "grease bills"—a stiff paste made of fuller's earth and vinegar, molded into balls and dried, wet the spot, scrape the ball over it, let it dry, and then wash it off with tepid water.

**INCREASING DEMAND FOR PATENT FUEL.**—The *London Iron and Steel Trades Journal* remarks that the utilizing of dross and culm to make patent block-fuel is an extending industry, and there are now a very large number of factories in operation. The word "waste" will soon have to be erased from the dictionaries of iron, steel and coal masters.

**LEAD PIPES FOR WATER CONDUIT.**—The decision as to lead pipes for water transportation seems to have resolved itself into this conclusion, viz.: that water simply traversing lead

pipes without standing in them cannot take lead enough to be poisonous in any degree, especially if the pipes are old ones, on account of the solid crust which forms on their inner surfaces. It is recommended, however, to paint the interior of new pipes with a layer of some mixture which prevents immediate contact and renders crust formation easier.

**HOW TO CLEAN HUCKSKIN.**—If it is not too much saturated with grease and dirt, huckskin can be cleaned with pipe clay. If it requires further cleaning, use the best of soap and water made into a lather. Apply with a stiff brush, but do not tug or stretch the garment. When the dirt is all removed, work the skin in the hands until perfectly dry. The Indians use a mixture of hains and water beaten into a stiff paste to clean huckskin, and then it is worked by hand until dry, when the skin becomes as soft and pliable as velvet.

**POLISH FOR PIANOS.**—Polish or varnish suitable for polishing pianos is made as follows: Take 700 parts of alcohol, 15 parts of copal, seven parts of gum-arabic, and 30 parts of shellac. The resins are first pulverized and bolted through a piece of muslin; the powder is placed in a flask, the alcohol poured over it, and the flask corked. By putting the flask in a moderately warm place, the solution will be accomplished in two or three days. It is then strained through muslin and kept in hermetically sealed bottles.

**MATERIALS FOR SOAP BUBBLES.**—The following recipe will make a very superior soap-bubble mixture, such as are used in scientific experiments: Take shavings of pure white castile soap, place them in a bottle, and fill with warm water. Shake occasionally for a few hours, and allow to stand over night. In the morning pour off the clear liquid and add to it nearly an equal quantity of glycerine. The bubbles blown from this mixture will be of surprising size and beauty.

**SOIL DRAINAGE IN ILLINOIS.**—It is said that tile enough has been laid in Illinois to reach three times around the globe, costing between \$10,000,000 and \$15,000,000; and the experiments of the Illinois University professors go to show that the best crops are found in the best drained soil.

**A PERMANENT BLACK ON ZINC.**—"Bluestone" dissolved in water with blacken the surface of sheet zinc so that it will not rub off. Wetting the surface of the zinc and rubbing the bluestone over it will have the same effect.

**RUST.**—Articles of iron or steel that have been immersed in a solution of carbonate of potash will not rust for years, even when exposed to damp atmosphere.

## GOOD HEALTH.

## "Nerve Waste."

Dr. H. C. Sawyer, a member of the Medical Society of the State of California, has written a treatise of 100 pages on nervous impairment. He uses no technical terms, but presents his views in a plain and direct way. He exposes many popular fallacies on the subject of remedies. Nerve foods and nostrums find no favor with him. The two things that do find favor are rest and fresh air.

Nervous impairment is traced to such causes as arise from without, as environment and heredity, and overwork and dissipation. Out of life is one of the most approved remedies. Nervous people are apt to exaggerate the meaning of all unfavorable symptoms, and by reason of great depression of spirits fear the worst consequences. "Thousands of medical vipers do all in their power to cultivate this wretched nerve, and derive large incomes by playing on this phase of nervous impairment." Neurasthenia is the national disease of overworked people in this country. These suggestions are worth noting:

Coming now to actual facts, the fats stand highest on the list for the nervous—cream, fresh butter, the fat of roast beef and heststeaks; the brain is rich in fatty substances, and fat goes to make heat and force. Fats, while highly nutritious to the nerve, are not so easily digested as lean meat, but, by keeping up his oxygen, the nervous invalid will find himself able to manage more and more of these substances. I am aware that nine men in ten who read this book probably abhor fat meat, but I advise each to begin with small quantities and cultivate a taste for it.

Next in value to the fats are the unboiled cereals; first of all, wheat, then oats and corn. Cracked wheat and cream is an ideal nerve food. Cornbread, the "johnny-cake" of New England, made of cornmeal, eggs and flour, thick, light and warm, and soaked with fresh butter, is a better nerve food than can be found on the druggist's shelves. Roast beef or juicy steaks are rich in the elements of brain nutrition, the phosphates of lime and soda, and the fats, besides yielding a larger amount of force to the household than any other food. The preparation of phosphorus that are put up by the Creator in such inimitable packages, in the germ of wheat, oats and corn, and in meats, have great advantage over the artificial products of the laboratory; they are more easily assimilated by the tissues because they are natural. Fresh fish and shell fish are light, easily

digested food—when properly cooked—but they have no special value as brain and nerve foods. Celery, I may remark, since I have been asked so often concerning it, has no value whatever in nerve nutrition.

**A CURE FOR WRINKLES.**—Wool fat or agnane is made from the wool of sheep by subjecting it to an alcohol treatment. By this process a yellow grease is precipitated chemically identical with an element found in the human bile and in certain vegetables such as peas and beans. This grease has recently been found to have one very peculiar property which was accidentally discovered by Dr. Morton Prince of Boston. When applied with rubbing it passes directly through the skin, and in this way acts as a nutrient to the fatty tissues beneath. Thus it has the effect of smoothing out the wrinkles produced by the attenuation of these tissues which comes with age. An antiquated lady has nearly removed from her temples the unwelcome footprints of a thousand figurative crows by six weeks' use of it. Dr. Prince has also used it with success in other cases, and it has created a sensation in Boston.

**GOOD HEALTH OF BRAIN WORKERS.**—Symmetrical brain development is an essential factor in a perfect constitution no less than muscular development. In fact, brain-workers average much the longest lives, in spite of the fact that they are apt to slight the muscular system. It is a commonly received notion that hard study is the unhealthy element of college life. But from tables of mortality of Harvard University, collected by Prof. Pierce from the last triennial catalogue, it is clearly demonstrated that the excess of deaths for the first ten years after graduation is found in the class of inferior scholars. Boating and baseball—to say nothing of the convivial temptations associated with them—will not only fail to give the world educated men; they will fail to make even healthy ignoramuses.

**APOTHECARIES' LATIN.**—A Berlin cotemporary informs its readers that the famous surgeon, Dr. Esmarch, is the leader of an attack upon "apothecaries' Latin," and he is supported in this campaign, on behalf of common sense in medicine, by several of the most eminent physicians and medical professors in Germany. He asks why a foreign tongue should still be employed by physicians in writing their prescriptions when a general expulsion of foreign terms and phrases and the substitution of their German equivalents has become the order of the day. A pharmaceutical lexicon is being prepared for the use of doctors and chemists as to assist them in prescribing and making up prescriptions in the tongue understood by the people.

**FOR POISON OAK.**—Among the many remedies for curing poison oak, the following is said to be an excellent remedy, and may prove of service to some of our readers: Dissolve one ounce of gum-shellac in six ounces of sulphuric ether; work tightly in a bottle. Bathe the surface where the irritation appears with cold water and wipe dry; then apply the above solution. The ether will evaporate, leaving an elastic coating of gum, impervious to the air. In about two minutes the most distressing case of poison oak can be relieved entirely of all unpleasant sensations. As the coating peels off, apply more of the solution, and in 24 hours the cure is performed.

**ONE WAY TO RESIST COLD.**—When exposed to severe cold a feeling of warmth is created by repeatedly filling the lungs to their utmost, with the shoulders well back and slowly (the garments being loose), the air entering entirely through the nose. When the lungs are completely filled, hold the breath for 10 seconds or longer, and then expire it quickly through the mouth. It is important for all to practice this exercise many times each day, especially in the open air. If this habit ever becomes universal, lung diseases and many others will rarely be heard of. A permanent expansion of the chest of one, two, and even three, inches will eventually follow.

**HOUSE POISON.**—If the condensed breath collected on the cool window pane of a room where a number of persons have been assembled has burned, a smell as of singed hair will show the presence of organic matter; and if the condensed breath be allowed to remain on the windows a few days, it will be found, on examination by a microscope, that it is alive with animalcules. The inhalation of air containing such putrescent matter causes untold complaints which might be avoided by a circulation of fresh air.

**RELATIVE VALUE OF THE DIFFERENT PARTS OF THE HUMAN BODY.**—According to Rundschau (Prag), the following table has been constructed for the workmen's society in Leipzig, showing the percentage value of different parts of the human body: Loss of both eyes, or arms, or hands, or legs, or feet, represents 100; loss of right hand, 40; of the right thumb, 33½; of one eye, 22; of the left thumb or right index finger, 14; or left index, and any other finger of the left hand, 4 per cent incapacity to gain a living.

**THE REMOVAL OF WARTS** is easiest effected by means of caustics, such as silver nitrate or nitric acid.

## ENGINEERING NOTES.

## A Cable Road With No Grip.

A cable road now being constructed in Newark, N. J., is attracting much attention from railroad engineers and owners of street-car lines in various parts of the country. The plan is novel, chiefly in having no grips on the cars and no stationary pulleys in the conduit. There are other striking features, however, and as a road of this kind has never been built before, except upon an experimental scale, railroad men are deeply interested in the trial. The erection of the road upon which the plant has been laid is about 8000 feet long, with several hills and hollows. The conduit, which lies midway between the rails, is constructed of rolled iron in lengths of 30 feet, and its inside dimensions are only 6 inches in width and 7 inches in height.

The conduit is furnished with two small tracks upon which two-wheeled trucks run and carry the cable. These trucks are formed of hollow cast-iron boxes containing oil, through which the axles run in vulcanite bushings. At intervals of five feet throughout the length of the cable, hollow buttons of malleable iron are firmly pressed upon the wire rope in halves and riveted together. The hollow spaces in the buttons are filled with type metal, which takes the form of the strands and secures the buttons so that, it is declared, the cable will break before one of them can be detached. The buttons go upon the cable in pairs, placed eight inches apart, and the carrying trucks are loosely hung upon the cable between the two buttons. When in position the trucks are five feet apart and can move freely around the cable. In going on a level or up-hill these trucks are supposed to run almost noiselessly upon the two tracks on the bottom of the conduit. On a down-hill section or in a hollow the tracks are placed on the top of the conduit as well as on the bottom, and the trucks are lifted a quarter of an inch and engage with the upper tracks. On curves, cast-iron sections of the conduit are provided with tracks which incline in due proportion to the radius.

The care will be provided with thin sprocket-wheels of steel, which will be dropped through the slot and be revolved freely by the buttons on the cable, while the car is standing still. When it is desired to start a car, the ordinary brake-handle, on the front or back platform, is turned to the left. This winds up a chain which brings a strap-brake to bear on a flange on the hub of the sprocket-wheel, and brings the wheel gradually to a rest, while one of its teeth engages with a button on the cable and the car is carried along. To stop a car the driver releases the brake-handle, and, turning it rapidly to the right, throws off the sprocket-wheel brake and puts the ordinary brake upon the wheels of the car.

The claim is made that this road will run almost noiselessly, and that a cable will last five or six years. Other cable roads must have new cables every year, but by this plan the wear of the stationary pulleys and the tear of the gripping apparatus are escaped.

## Noise on Railway Bridges.

The Government managers of the new city elevated railway in Berlin have taken a great deal of pains to diminish the noise of trains passing over the viaducts and bridges which form the principal portion of the road. The metallic structures employed in such places rattle and reverberate in a manner which is considered very suitable to the nerves of the people of New York, but which the Germans are not disposed to endure. In experimenting to find means for overcoming the trouble, it is found that the form of the bridge does not perceptibly affect the noise, a lattice truss, notwithstanding the multiplicity of joints, producing no more sound than a plate girder; but the length is a very important factor, so much so that the noise is considered by German engineers to be directly proportioned to the span of the bridge. Where the rails rest on wooden cross-ties, or on timbers running longitudinally, the sound is less than where they are secured directly to the metal, and it may be still further diminished by placing cushions of felt or rubber under the timbers before bolting them to the bridge construction.

To cover an iron bridge entirely with planking does not appreciably diminish the noise unless the planking is covered with gravel, a thin layer of which has a marked deadening effect, while still more improvement is obtained by thickening the layer of gravel about the track so as to bury the cross-ties or longitudinal timbers on which the rails rest. Profiting by these suggestions, the Berlin engineers have adopted two different systems for diminishing the noise of trains on their viaducts. One is to bolt to the bridge structure long troughs of sheet iron, about 16 inches wide, so arranged that a rail will come in the center of each. The troughs are then filled with gravel, in the middle of which is buried the longitudinal timber carrying the rail, and the space between the troughs is covered with iron plates on which is spread a thin layer of gravel. The second method, which is found to be more efficient than the other, consists in placing a continuous series of shallow iron troughs, about five feet square, along the line of the tracks. These are filled with gravel on which the ties and rails are laid.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**AMADOR GOLO MINE.**—*Amador Ledger*, March 17: Last week a large body of water was encountered in the west drift at a distance of 250 feet from the shaft. The flow of water was beyond the capacity of the machinery to control, and all work has been suspended since. It is supposed that this extraordinary increase of water is due to the drift coming in contact with the main ledge, and is consequently regarded as a most favorable indication. When the water was struck the flow was too great to admit of a careful examination of the ledge matter that was washed into the drift. The first day the water gained two feet, in spite of the drainage facilities being worked to their utmost capacity. It has been gradually reduced since, showing that it was merely an underground reservoir connecting with the ledge that was tapped. In a few days it is expected that the water will be again sufficiently under control to permit the resumption of work. The hoisting machinery over the south shaft was started this morning.

**SUTTER CREEK.**—*Cor. Amador Ledger*, March 17: Preparations for the erection of 10 more stamps at the Wildman mill are progressing as rapidly as possible. The patterns for the mortars are about completed, and in about another week the mortars will be cast and in a few days more they will be ready to be placed on the blocks. The mill is being run regularly and the rock that is being crushed is paying very well. There has been a cleanup at the Lincoln and the result did not come up to expectations. The four men who have a lease of it have discharged all of their hired help, and have concluded to do the work themselves and will only run 10 stamps. If the next cleanup is not better, in all probability they will close down entirely. Chas. Smith, one of the lessees, having received a good offer from Arizona as millman, has concluded to accept the offer and will start for Arizona in a few days.

**PLYMOUTH.**—*Cor. Amador Ledger*, March 17: It may be some time before there will be much doing in Plymouth Con. mines. The New London is apparently very prosperous and big things are expected of it by the people here. Supt. Cupps of the New Chicago M. & C. Co. has gone to San Francisco on business connected with the mine. Sinking is still going on at a lively rate and a mill is talked of. From all accounts the rock in sight would fully justify a good mill being put up. Mr. Etling has got through crosscutting on his claim known as the Mammoth, and he has commenced sinking again. He is very much pleased with the appearance of the lead so far as he has been able to examine it, and shows some very fine specimens of rock carrying gold and gold-bearing sulphurets in great abundance. Tom Bawden and the War Eagle Co. are still working and speak in glowing terms of their prospects.

## Calaveras.

**ANGELS MINING DISTRICTS.**—*Calaveras Chronicle*, March 17: The Matson mine, adjoining the Gold Cliff mine on the south, has been sold to Mr. Chas. D. Lane, who will erect a ten-stamp mill at once and begin operations in the mine. The Uica mine, owned by Hobart & Haywood, is running in full blast day and night and yielding good returns. The new hoisting works on the south are nearing completion as circumstances will permit. The stone foundation for the new engine is nearing completion, and it is expected the machinery will be in running order about the middle of May next. The Nevills mine is running full-handed and yielding good results. The ore now being extracted is taken from the 400 and 200 foot levels. The Angels mine is steadily pushing developments, both on the surface and underground, and everything is being put in condition for the spring and summer campaign. This is a very valuable property and we soon expect to hear of big returns. There is some talk of the Stevenot mine at Carson Hill falling into the hands of a wealthy English company shortly. The sum to be paid will range well up in the thousands.

## El Dorado.

**GOOD ROCK.**—*Mountain Democrat*, March 17: John Melton is certainly a lucky dog. About three years ago, a party at Grizzly Flats found some rich rock, and Melton, H. H. McClellan, and B. G. Parlow gave him \$50 for his find. It was afterward found to be nothing more than a large quartz boulder, and no work was done. Recently, however, Melton insisted on looking further into the same vicinity. A shaft was started and put down 50 feet on what was thought to be the ledge. One hundred tons of ore was extracted and crushed, paying \$800. At 50 feet the ledge is 2½ feet wide, and better rock in sight.

**SPECIMENS.**—We were shown some very pretty and rare specimens of gold Thursday last, from the Greenstone—Mother Lode. The specimens were pure gold and of crystallized formation. They were mined out by Fred Schuster, whose claim is located on the American river above Chili Bar. Mining men admit the rarity of this quality of gold, and having come from the Greenstone, the crosscutting of this famous ledge by the Big Tunnel Mining Co. will be watched with interest. Supt. McNeil tells us that this ledge will be tapped at 1600 feet.

**BIG TUNNEL.**—The Big Tunnel Co. are making an important improvement in their reservoir, by means of which the expense of running their air compressor will be reduced fully one-half. The tunnel is progressing rapidly and during the past week cut a vein five feet wide, showing free gold and iron pyrites. This is the second gold-bearing ledge that has been cut in the 230 feet.

**MILLING ORE.**—*Placerville Observer*, March 17: Ike Berson, who has been diligently at work on the Sandstone at Poverty Point for some months past, has on the dump, as a result of his labor, 50 tons of milling ore of fair grade. Mr. Berson has tested the ore and is so well pleased with the result obtained that he will keep adding to the dump until he has accumulated tons enough to give the Poverty Point mill a good paying run.

**LOOKING BETTER.**—The town has been overrun with miners and capitalists seeking investment in mines lately, and the mining prospects of the county

are looking better than for years. With the advancement of spring will come many more of this class, and they should be encouraged by all.

## Nevada.

**THE DELHI MINE.**—*North San Juan Times*, March 16: A report came from North Columbia Tuesday that another rich strike of rock, richer than ever, had been made in the Delhi mine, at a point, too, where it was not looked for. During the fiscal year ending Feb. 29, 1888, 7000 tons of rock were run through the mill, most of the time but eight stamps in operation, which yielded, on an average, \$21.24 per ton, or a total of \$148,692.27. Three hundred and eighty-one tons of sulphurets were worked up to March 1st, from which was realized the sum of \$85.64 per ton, or a total of \$33,628.94—making a grand total of \$181,321.21. The rock and sulphurets yielded in the aggregate \$25.90 per ton, on an average. The running expenses for the year amounted to \$33,409.83. During the year dividends to the amount of \$100,000 were declared and paid. During the year ten stamps were added to the mill, sulphurets works, boarding-houses and other buildings were constructed and many other improvements made, and to-day the mine does not owe a dollar. It must be remembered that all the rock taken from the Delhi is crushed, good, bad and indifferent. There is no picked rock nor any refuse rock; all passes through the screens.

**THE WASHINGTON MINES.**—*Herald*, March 15: The mines about Washington are all doing well and the people who come down from there are sanguine that the season is going to be a very prosperous one. The Washington mine has the new rock-breaker in place, which will enable the owners to work the rock at a reduced cost. The Yuba never looked so well as on the lower level. The shaft being sunk for the next level is showing the same quality as far as sunk upon—60 feet, and the superintendent says if it continues to the next level as good as now, the mine could not be bought for double its present assumed value. The Blue Bell grows better with each day's development. It is thought the Eagle Bird affairs will soon be in shape and that mine will be started up. Washington district is all right.

**MINE LEASED.**—W. J. Organ has leased his ledge on Deer creek, to John Murchie & Co., who are now at work. They have extended the old tunnel 30 feet and will continue it till they strike a pay shoot which is known to exist some 70 feet further in the hill.

## Placer.

**UPRA' SE.**—*Argus*, March 18: The miners at the May Flower mine started an upraise over a week ago, and it was expected to strike the channel some time this week. The tunnel is in 5200 feet.

**IOWA HILL.**—*Placer Herald*, March 17: H. L. Lightner was here last week on his way to the Pioneer quartz mine, recently purchased by Fair & Davis, to start operations, but the snow has postponed this work for a short time. Undoubtedly there will be active times here this summer in mining circles. We need it. There are no hydraulics running, except by Chinamen, and business is dull and not likely to be better until operations commence on the divide above us.

## Plumas.

**LA PORTE.**—*Plumas National*, March 17: Times are very quiet, but the outlook for the future is good. When the tunnel now being run taps the rich channel under Bald mountain there will be a "boom" what is a boom. The Claybank tunnel is being pushed ahead as rapidly as possible. The outlook for a water season is not very good, but there is plenty of snow, if we have our usual spring storms, to give us an average season.

## San Diego.

**OWENS.**—*Juan Sentinel*, March 17: Joseph Marks bought the Owens mine and mill at the sheriff's sale last Saturday. Consideration, \$4000. This amount covers the indebtedness.

**MESA GRANDE.**—A. P. Frary Jr., of the Shenandoah mine, Mesa Grande, was in town on Tuesday, looking up a crew of men for working the mine on a large scale. The mine is under the charge of Superintendent Farley, an experienced and practical miner, who will be assisted by the best force of men to be found in the district.

## Shasta.

**NEW MILL.**—*Shasta Courier*, March 17: The new five-stamp mill on Frank Wheeler's claim, French gulch, works to a charm. In 22 days from the time the machinery was shipped from the Mechanic Manufacture Works in San Francisco, the mechanic who came up with the machinery set the mill in motion, and every part of the outfit worked to perfection. The Texas and Georgia mine was bid in at sheriff's sale this week, on mortgage, by Rev. Flemming, for \$7700.

**LOADING MACHINERY.**—*Shasta Democrat*, March 17: The Calumet Gold Mining Co. will do no more milling until their water-power is completed. In the meantime they are adding more machinery to their already large plant, and fixing generally for reducing from 80 to 100 tons a day. Last week Louis Gross purchased 7 mining claims in Squaw creek.

**COPPER CITY AGAIN.**—Lem Williams of Copper City was in town last Friday, and seemed to be in high spirits over the latest developments at that camp. The company which has had a lease of the Winthrop mine for a long time back has turned the mine over to the owners, Stanley & Co., of San Francisco, and Mr. Williams was put in charge of the property. Lem also secured a lease which permitted him to prospect the mine for all the ore he could get out till he struck the main lead. Late last fall he struck a fine prospect on new ground near an old tunnel that was made many years ago, and following it up with an open cut took out several tons of rich float ore, and a few days ago struck the main body of ore which he believes is a veritable bonanza. The vein where encountered is 14 feet between walls, and at this place the ore shows "oodles" of horn silver and free gold—a large specimen of which we have on exhibition in this office. Mr. Williams believes he has struck a chimney, and the prospects are that it is a large deposit of very rich ore. The company will fully develop the new strike, and so confident is Mr. Williams of its richness and permanency that he firmly believes the resurrection of old Copper City is at hand.

## Sierra.

**THE KENTUCKY.**—*Tribune*, March 16: At this mine yesterday a cleanup of the four-stamp mill was

made after a run of 30 days. The amount of the yield has not been made public, but it is understood that it was sufficient to balance the expenses of running the mine. This is certainly very good considering the difficulties the management has had to contend against most of the time. It is expected that a much better showing will be made the ensuing month. Some very fine ore is being taken out of the raise above No. 2 tunnel. D. L. Whitney and L. Foss are pushing ahead developments upon their quartz claim, located between this place and Downsville.

**YOUNG AMERICA.**—*Mountain Messenger*, March 17: The Young America Co., this spring, as soon as No. 2 tunnel is extended through the mountain, will utilize it for carrying water from Packer lake site into Upper Sardine lake that supplies their mill with water, when crushing can be done the year round. Thirty stamps are running, and 110 men employed. Pay ore is expected at most any time in No. 3 tunnel that will tap the vein 870 feet below the present workings. The cleanup for 30 stamps for 18 days' run, last month, was \$12,700. Everything at the mine prospers under the able and economical management of Supt. Steven Moore, late of Grass Valley, Nevada county.

## Trinity.

**EAST FORK.**—*Cor. Trinity Journal*, March 17: We are still scattered some, for it is several miles from the first mine one strikes after leaving North Fork until the last one on the headwaters of East Branch is reached. Just how large a section of country is mineral bearing is hard to determine. The nearest mine to North Fork is the Ozark, about 5 miles away, and the most distant in the district is 6 miles above Rattlesnake, 30 miles from North Fork. A very small portion of the mineral belt is prospected. During the past winter more work has been done toward developing the different prospects than ever before, and when spring fairly opens the mines will be in a condition to ship some bullion. Day & Moor are steadily running their astras on rich ore taken from the Ozark. The Thanksgiving mine is doing a great amount of development work, and taking out ore; a tunnel is being run 6x7 feet in the clear to tap a large body of ore found the past winter; their astras are running day and night under the supervision of Mr. Smith of the Golden Chest. The Enterprise, under Mr. Jackson, superintendent, is showing up fine. Webfoot mine has proven to be one of the largest lodes in the district; the owners have a tunnel in on the ledge about 120 feet; in places the lode is 9 feet in width; judging from the amount of sulphurets and free gold to be seen in the rock, it will be a bonanza for the boys. The Fountain Head mine, owned by Frank Moor, is showing up well; some very fine specimens of rich ore are to be seen in the quartz on the dump. The only new discovery this winter, so far as is known by the writer, was on the Yellow Pine location; the lode being two feet in width, and estimated at \$50 a ton. The Golden Chest owners have done considerable work in the shape of tunneling to determine on the erection of a mill during the summer; very rich ore has been found in the different tunnels, leading to the belief that the mine is rightly named. The snow during the past winter did considerable damage to the different mines, and the high water afterward, sweeping away dams, ditches and roads, has caused considerable inconvenience. Mr. Al. Thurston showed me some ruby sand, great quantities of which are found mixed in the foot-wall of his mine. Mr. Thurston owns one of the largest sulphurets mines of East Fork.

## Tuolumne.

**QUARTZ ITEMS.**—*Sonoia Democrat*, March 17: Mr. Glasson and partner struck a pocket of \$400 in Saratoga hill last week. Judge Preston of Jamestown is making arrangements to build a mill on Blue Gulch. Quite a number of mining men are in Sonora at present, looking at Tuolumne's resources. Reports from the Platt mine say that a two-foot vein has been struck which is rich in free gold. The mine and mill of Soulsbyville, under the able supervision of Civil and Mining Engineer Shawwood, have been started under full headway. A lead has been discovered near Copperopolis by a Mr. Curtis, and last week he was offered \$5000 for the property, but he asks \$15,000. A. J. Lane of Knights Ferry has purchased the Madison property at Angels. It is estimated by experts that at least \$30,000 worth of ore is in sight. The lode is 40 feet in width. Mr. Jo Hampton and Mr. W. Long are operating the Cardinal mine at Tuttle-town, which 20 years ago gave forth nearly 200,000. It is reported that the Riverside mine above Columbia has made a fine development. Rich rock is reported to have been struck at a depth of 1200 feet. A long tunnel running in from the base of the mountain taps the lead at a depth from the top of that number of feet. The lead at that depth is said to be 50 feet in width. Mr. Fred Sutton, who is working his mine, the San Giuseppe, sent a bar of gold to the mint at San Francisco recently. The return certificate shows the gold to be 989 fine, or \$20.62 to the ounce. As \$20.67 is the value per ounce of chemically pure gold, and as the bar of gold was the result of common metallurgical treatment and had nothing in common with chlorination process, the fineness is remarkable. The reports from the New Albany mine indicate splendid results, and the appearance of the mine justifies the belief that the present developments are on the rich chute which was lost years ago. Some 200 tons of quartz are out on the dump, and Messrs. Long and Kirk are getting the mill and attachments in order, preparatory to crushing. The lead is now about 4 feet across, and gold is visible in nearly every piece of quartz.

**BLACK OAK.**—*Tuolumne Independent*, March 17: The Black Oak at Soulsbyville continues to develop rich. It bids fair to discount the old Soulsby mine. There is nothing black about it except its name.

**PLATT.**—The Platt mine at Soulsbyville, near the Raymond mine, is getting out rich rock, which will mill \$30 per ton. The shaft is down 120 feet from the surface, and the vein is improving as depth is attained.

**NEW MILL.**—J. R. Ritchie's new mill at Tuttle-town commenced running on Friday of last week. Everything moves like perfection, and the ore is believed will prove all that is expected of it.

## NEVADA.

## Washos District.

**BELCHER.**—*Virginia Enterprise*, March 17: The east crosscut on the north line is in 144 feet. The

ground passed through shows no change. The west crosscut is in 60 feet, the last 20 feet showing considerable quartz that assays from \$6 to \$14 per ton, and there is some water coming in the south side of the drift. It is the intention to run south on this quartz. The Suto tunnel drift is out 1310 feet.

**HALE AND NORCROSS.**—Since the last report the south drift on the 400 level has been advanced 40 feet, and have commenced stoping ore from this drift on the south boundary. The north drift on this level has been temporarily discontinued. On the 700 level the drifts north and south from the top of the upraise have been connected and show a continuation of the ore body between the two upraises. During the past month there was shipped and reduced at the Vivian mill 1200 tons of ore, which yielded about \$36,000. Are now shipping 130 tons of ore per day to the Mexican mill. The ore stopes throughout are looking well.

**GOULD AND CURRY.**—Have extracted 50 tons of fair-grade milling ore from the 250 and 300 levels, and stored the same in drifts during the week. On the drain tunnel west crosscut No. 1 from the main south drift has been advanced 39 feet; total, 59. This crosscut has passed through the old west stopes, and the face is now in low-grade ore. West crosscut No. 2, near south line, on this level, has been advanced 48 feet. This crosscut is in the old west stopes.

**BEST AND BELCHER.**—East crosscut No. 4 from the end of the main north drift, near the north line, has been extended 45 feet. The formation is quartz showing value. The upraise has been carried up 22 feet; total height above the track floor, 100 feet. The formation in the top of the upraise is quartz, giving better assays than the drift below.

**POTOSI.**—The south drift on the 930 level is in 406 feet. There has been no crosscutting on this level yet. The south drift on the 540 level is in 304 feet. The face is all in quartz giving low assays. The west drift (Belvidere) is showing fine-looking quartz.

**CROWN POINT.**—On the 500 level have stopped the north crosscut temporarily and started a winze from the 400 level south drift, 100 feet south of the raise from the 500 to the 400 level, intending to follow the ore. It is down 16 feet, all in very good ore.

**SAVAGE.**—During the past month have shipped and had reduced at the Mexican mill 416 tons of ore, which yielded in bullion \$81,086.26. Tuesday commenced shipping ore to the Rock Point mill, which started cr. h. yesterday.

**BULLION.**—Are cutting out a station at the head of the winze on the 500 level, and will put up a steam hoist over it to make extensive explorations at that point. An engine has been shipped from San Francisco.

**ANDES.**—The drift on the 350 level, which has been running east, has been turned northerly. The face is in good ore, and the prospect is flattering. It is expected to connect this drift with another at that point.

**ALTA.**—Are upraising in Lady Washington and sinking on the Keystone vein to meet the upraise from the 725 level. Running a south drift on the 825 level and a north drift on the 1150.

**SCORPION.**—On the 300 level the north drift is out 142 feet and the south drift 125 feet. When these drifts are advanced 30 feet further, crosscutting on this level will be commenced.

**CHOLLAR.**—The main incline has been timbered 48 ft. below the 900 level. Below this point the incline is open and only needs to be retimbered to the 1300 level.

**SEGREGATED BELCHER.**—The south drift from the raise is in 232 feet, having made 18 feet during the week. There is no change in the ground to report.

**UTAH.**—The incline upraise from the end of east crosscut No. 3 has been carried up 48 feet. This upraise is in east country rock free from water.

**BALTIMORE.**—Work progresses favorably in the northwest drift on the 350 level. Have not yet intersected the place where ore was found.

**YELLOW JACKET.**—Are shipping ore to the Brunswick mill, which is extracted from the 1200, 1300 and 1400 levels.

**IOWA.**—Work of repair on the 500 adit level progresses favorably, and work has been resumed in the face of the tunnel.

**JUSTICE.**—The usual amount of work is being done in this mine, and the extraction of ore continues.

**OCCIDENTAL.**—Have extracted 78 tons of fair-grade milling ore during the week.

## Aurora District.

**ANTELOPE.**—*Esmeralda News*, March 17: Hon. Horace Marden went to Aurora Thursday. His return to the old camp is said to be significant of the starting up of the Antelope mine. It is expected that the owners of that mine and the Silver Hill mill have consolidated their property and that the mine will be worked for all there is in it. There has been sufficient work done on the claim to demonstrate that it is a good one. The vein though of low grade is amply made up for in its size, strength and the free-milling character of the ore.

## Eureka District.

**ORE SHIPMENTS.**—*Sentinel*, March 17: During the past week ore shipments were made from the mines of the district as follows: To the Eureka Con.—Belmont mine, 7 tons; Silver Lick, 16 tons; Margueretta, 1 ton, and Jackson, 19 tons. To the Richmond—Marguerite mine, 8 tons; Phoenix, 6 tons; Dunderberg, 3 tons; Seventy-Six, 6 tons. The above is the lightest business in side ores that our furnaces have recorded for several years, owing to the very heavy condition of the roads leading to the mines, but as soon as the teams can make regular trips we expect they will have all the ore hauling that they can attend to.

## Globe District.

**GOLO.**—Belmont *Courier*, March 10: The Downey Bros. are working their gold mine in this district. It is producing some very fine ore which is shipped for reduction.

## Gillis District.

**THE STAR MINE.**—*Walker Lake Bulletin*, March 17: The Star mine is more than fulfilling expectations. The shaft is now down 140 feet with good ore in the bottom. A drift has been run 50 feet from the 70-foot level, which shows a strong ledge of good ore all the way. The shaft will be sunk 20 feet deeper, when drifting will be begun. Enough ore



has been taken out in sinking to more than pay the expenses of development, and when the miners begin stopping the profits will be large, as the pay rock is in sight to work on.

#### Hawthorne District.

**THE POORMAN'S DISTRICT.**—Walker Lake Bulletin, March 17: Hawthorne district is more promising than ever before. It is the Poorman's district, emphatically. A number of the mines are now paying, and those that are showing fine prospects are increasing in number every day. Another development recently made in the Lapanta has added largely to its value and the lessees and owners have a certainty of a large dividend. The Pamlico continues its record as a profitable mine. The lessees of the Evening Star have a good strong ledge of rich ore in sight from which they have taken more than wages and expenses while sinking a winze. John Striker's mine, the Green Isle, is looking as well as ever. Tubino's Gold Bar is yielding good ore, and many other claims, such as the Puritan and North Star, will soon be worked. The miners find gold near the surface and are not obliged to spend a fortune before getting returns. A short time ago Webber gathered some earth from a gopher-hole on his claim, and on panning it out found that it was rich in coarse gold. This year will doubtless see more work done in Hawthorne district, and more money taken out than in the entire previous time of working in that section.

#### Ione District.

**HIGH-GRADE ORE.**—Esmeralda News, March 17: The mines around Ione, Nye county, never looked better than at present. The miners are taking out ore of high grade and plenty of it. There will be several tons of ore shipped to the Reno Reduction Works from the Ione mines within a few days.

#### Mammoth District.

**SHIPPING ORE.**—Belmont Courier, March 10: Alfred Welsh is busily engaged working his Lodi mine and shipping the ore to Reno for reduction. His last shipment was 15 tons of high-grade ore. Nothing to speak of is being done at Downeyville or Ellsworth.

#### Paradise District.

**COPPER AND SILVER.**—Belmont Courier, March 10: Hon. A. B. Millett and James Graham have a force of men at work in their copper and silver mines.

#### San Antonio District.

**LOOKING WELL.**—Belmont Courier, March 10: A. B. Eastwood has had some ore worked in Candalaria. The returns were satisfactory. The mines are looking well and producing a fine quality of ore. Mr. Eastwood is now on his way to Eureka with eight tons of ore which is being hauled by Jas. Fraser's team.

#### Taylor District.

**CO-OPERATIVE MINING.**—White Pine News, March 17: There is some talk of forming an organization in Taylor for the purpose of working some of the many promising prospects around here—and there are many to make a choice from. If our business men would all join in the enterprise the cost to each would be very small, with the chances of it repaying them a hundred-fold.

#### Tuscarora District.

**BELLE ISLE.**—Times-Review, March 17: No change in the workings in the old stopes.

**NORTH COMMONWEALTH.**—North drift prospect shaft has been extended 35 feet. The vein continues regular and well defined.

**FOUR TREASURE.**—Southeast drift, 150-foot level, has advanced 10 feet. Upraise No. 1 has been carried up eight feet.

**NAVAJO QUEEN.**—Good headway is being made in northwest crosscut, 200-foot level, which has been extended 16 feet during the week. The ground is looking very favorable, showing streaks and bunches of low grade in face of drift.

**GRAND PRIZE.**—South drift on the west vein, 300-foot level, extended 18 feet; total length, 223 feet—the vein being large but low grade.

**NEVADA QUEEN.**—On the east vein the drift has been turned north on the ore and advanced 20 feet. The grade of the ore has steadily improved going north, the face being all in good ore.

**NORTH BELLE ISLE.**—North drift, 400-foot level, has been advanced 14 feet. The vein looks favorable, shows considerable quartz and some ore. Fair progress has been made in opening up the front stope on the 300-foot level. The average output of ore continues the same in grade and quantity.

**COMMONWEALTH.**—South drift from station, 150-foot level, has been advanced 27 feet. Have cut through several seams of good ore from 3 to 12 inches thick. Face is looking very favorable to soon reach the main ore body. Ore taken out for the week averages over \$600 per ton.

#### ARIZONA.

**NOTES.**—Prescott Courier, March 16: Mr. Thompson tells us that Mr. Prout, who is examining mines in Copper Basin for an English company, is very well pleased with them. The basin is about 12 miles from Prescott. The road to United Verde will soon be dry, and coke, etc., will be taken to the smelters. John A. Jones is running his mill. It is 6 miles south of Prescott. Mr. Kastner and a party of miners left Prescott yesterday morning for the Congress mine. Dan O'Boyle is crushing gold rock in an arrastra, at the Montgomery mine, which is said to be 140 feet wide. A satisfactory cleanup of gold was made at the Lynx creek hydraulic mines, a couple of days ago. Paul S. Johns and Tom Reese are here from the Etta mine, which is opened to a depth of 200 feet. Ledge is large and rich in gold. Men are repairing the road to the mill. Mr. Raymond is here from his mine near Kirkland valley. Rock getting richer in free gold. He brought in several good specimens. Now that the weather is fine, and roads pretty good, miners will keep the sampling works busy.

**GLOBE DISTRICT.**—Silver Belt, March 17: Silver mining in Globe district, as is carried on up to date, either by individual or companies, has in nearly every instance been confined to surface work; real depth has never been attained as yet, and this fact, probably more than anything else, has caused, in many instances, unfavorable results. We recollect very well the time when the Old Globe mine, at a depth of 150 feet, was by many pronounced played

out, because good ore had ceased to be in sight, but notwithstanding the unfavorable outlook at that time, work was kept going with the view to attain depth, and the result was the opening up of a mine of wonderful richness. Thousands upon thousands of tons of the finest ore have been extracted since then, while now, at a depth of 500 feet, the formation has become more regular than ever, and the ore body in sight is simply wonderful.

**CENTRAL SILVER MINING CO.**—Florence Enterprise, March 17: One of the very promising mining properties of Pinal county is the group of claims 12 miles south of Casa Grande, recently sold by Mr. J. C. Loss to the Central Silver Mining Co., of St. Louis, Mo. The group consists of three claims, the Horn Silver, Silver Reef and Gray Eagle mines, upon which quite a large amount of development work had been done prior to the sale. Now three shafts are being sunk, one of them to be carried down 400 feet and the others 300 feet each. An ample force of miners are employed, and so soon as the hoist arrives additional men will be put on. Steam hoisting works and a 20-stamp mill have been ordered, and during the three or four months pending the construction of the mill at San Francisco the work of development will continue and the already immense ore body will be explored to a sufficient depth to determine the permanency of the mines. The company operating these properties organized under the name of the Central Silver Mining Co., with Messrs. Jno. Stephenson as president; Sig. Mayer, vice-president and secretary; Jno. Gaunt, treasurer, and W. W. Ashby, superintendent. The company will work the properties upon a legitimate business basis, and, as the immense body of ore already opened up will mill an average value of over 25 ounces of silver to the ton, they have a good prospect of large future dividends. This enterprise will add another producing property to Pinal county's long list of paying mines, and it will assist materially in the general prosperity of the southern portion of the county as well as of Casa Grande, its base of supplies.

**QUEEN OF SHEBA.**—Word comes up from the southern portion of the county that Superintendent Arthur H. Elliott has encountered ore in the Queen of Sheba mine, near the Vekol. In this discovery he has fully vindicated his good judgment, as his faith in the continuation of the Vekol vein through the Queen claim remained unshaken by the predictions of men who called themselves miners that no ore would ever be found therein. Mr. Elliott and his company are working in complete harmony, and while they have never taken occasion to claim more for their mine than could be backed by tangible evidence, they are likely to develop fully as valuable a mine as they hoped to find.

#### COLORADO.

**CRESTED BUTTE.**—Elk Mountain Pilot, March 17: Crested Butte wants a smelter and wants it bad. We produce all kinds of ore, and have coal, coke, lime, etc., right here, so that a practical man to start with a 20-ton furnace would be able to double the capacity inside of three months. We are in a position to guarantee a smelter 20 tons of ore per day. From Brush creek on the east, forming a complete semi-circle on the north to Irwin on the west, you can get any kind of ore needed.

**SYLVANITE.**—The progress on the Sylvanite crosscut tunnel this winter has been satisfactory to the management and Supt. Murphy. Work was commenced on January 5th, and about 225 feet has been driven through some of the hardest kind of rock. A Rand drill was used by compressed air, drilling and breaking sometimes six and eight feet a day. The full distance this tunnel must be driven to accomplish the purpose for which it is intended—cut the Sylvanite vein at a great depth—is a little less than 1500 feet, and from the distance run it will have to be run about 1250 feet. It is claimed that the work so far has cost about \$13 per foot. Work is progressing steadily at the Bullion King mine. The mineral in the lower level is improving very much of late. The anthracite coal mine started up again yesterday. When it shut down two weeks ago it was reported that it would not commence work again until about the first of May, but the orders come in so lively that the company were obliged to go to work. Only a small force will be put on at present, but no doubt it will be gradually increased until the full quota of men will be at work. As soon as the Burlington strike is declared off there will be plenty of demand for coal. The C. C. & I. coal mine here is still working on half and three-quarters time, with no immediate prospect of improvement very soon.

**LEAVILLE MINES.**—Leadville Dispatch, March 10: The Big Chief is daily expecting to cut the Castle View ore-chute. The drift is being driven south-east. The shaft is making very little water. The Gilt Edge, in California gulch, has struck some paying sulphide ore. The mine has had a large body of low-grade sulphide for some time, but until lately did not seem able to get any that would pay. The Moyer shaft of the Iron Silver Co. has a good body of pay. This mine and the Gilt Edge seemed to be sisters in misfortune, and luck also, as they have each found good ore in the same week, and have each worked for a long time in low-grade sulphide ore. The Castle View mine has cut the ore body in the east drift from the bottom of the shaft. The drift was run in on a level and caught the ore on its pitch to the east. The Castle View is producing some but has not entered the lists as a regular shipper. Mr. Mike Kennedy of the Hibernia and May Queen is superintendent, Mr. John Curtin having resigned that position. Manager Harrison of the Leadville Consolidation has just completed cutting the pump station at the 480-foot level in the Hege-man shaft and will begin drifting on the contact in a day or two. From indications it would seem that if there is a second contact in that vicinity the Hege-man shaft has it. Stopping in the old workings has begun and shipments may be expected therefrom. The Col. Sellers is under the efficient management of Charles L. Hill, showing immense bodies of sulphide ore. The big chute found in the A. Y. and Minnie crosses the Sellers territory and has been opened 125 feet of its length.

**EMPIRE.**—Georgetown Courier, March 15: Empire is having quite a little boom. A concentrator will soon be in running order and then it will be possible to make a large and economical saving in the treatment of pyritic gold ores. Mr. Vivian will return to England shortly to close up a deal by which many of the best known lodes pass into the

hands of an English company that proposes extensive development and the erection of powerful machinery. His return at this season was to settle up the Kohinor-Donaldson affairs, which company has also raised an unusually large working capital and will resume operations very soon. Mr. Vivian will represent that company also. He has succeeded in convincing investors that Clear creek has gold ores and plenty of them, and all that is needed is work and economical management.

**THE MENDOTA.**—A. Lundstrum, lessee, has taken the water out of the bottom of the old shaft on the Mendota and commenced work upon the lower level west. A millrun on Saturday of a mixture of galena, resin-blende and rock, of which there is from 8 to 14 inches, returned 113 ozs. silver to the ton. Ed Jones has, in the east level above, from two to three feet of galena, and two men are taking out about ten tons a week and making \$20 a day.

#### DAKOTA.

**OUTLOOK FOR DEERWOOD.**—Pioneer, March 16: A few days since the Pioneer called attention to the fact that lead ore had been found in the Oxford mine, Bald Mountain district. The ore was described as appearing in a vein from 6 to 18 inches wide, and as resembling closely the carbonate ores of Leadville, Colorado. The percentage of lead is stated at from 15 to 40, while the value of silver shown by assays has reached as much as \$353 to the ton of ore. As before remarked, chief importance attaching to the find is because, until its announcement, the presence of any other than arsenical refractory ores in the district had not been apparent. Inquiry and research among owners of other claims in the same district, who at present are pushing developments upon their properties, brings to our knowledge that in at least two other instances similar discoveries have recently been made. One of these is in the Ajax lode, the property of Messrs. Koenigsberger and Delano. The other is a claim belonging to John Greenough. In both cases the percentage of lead contained in the ore is exceedingly large. An established fact concerning the Bald Mountain mines is that the ore bodies are of more than usually large proportions. The formation is a flat one; the ore occurring in blanket veins spread over a large area. The deposit frequently presents an unbroken width of 50 or 60 feet, and is usually from 10 to 18 feet thick. In one or two notable instances, the Buxton for instance, the dimensions are even greater than described. These facts appearing beyond controversy, a natural deduction is that development of the bodies of lead ore recently discovered will demonstrate them to have equally large proportions; in which event the ultimate output from this district can hardly be estimated. It is beyond conjecture, for the obvious reason that the exploration of other properties may at any time result in similar disclosures. It never rains but it pours. For years, while struggling with the problem of cheap reduction for the ores of the district, the best informed miners had no knowledge that any appreciable quantity of lead existed in a single one of the mines. Had the discovery been made three or four years since, a large smelting plant would undoubtedly now be in operation. The date when such a plant will be erected is at present contingent on the rapidity with which developments of these lead ores are made.

#### IDAHO.

**TIPTOP.**—Inter-Idaho, March 16: The deed of the Tiptop mine of Rocky Bar has been put on record. The price was \$50,000 and the purchaser was Frank Hodgkinson, residing at Petersburg, England, but a citizen of the United States. He is probably acting for an English company. The seller is Edward C. Thompson of Meadville, Pa.

**THE BONANZA COUNTRY.**—Ketchum Keystone, March 10: The present indications are that this rich mining district will be the scene of unusual activity during the coming season. The extensive operations which will be set in motion by the Dickens-Custer Co., Limited, as soon as the snow shall have disappeared; the additional exertions that will be made by Morrison & Pearsons in the working of their rich mining claims on Jordan creek—which proved so remunerative in the first operation of their mill last season—together with other mining enterprises that will be likely to start up, all betoken a vigorous campaign and a successful season's operations. These operations will of course increase the amount of freighting supplies and machinery to be done from Ketchum, it being the natural outlet and nearest point to the railroad. The Ketchum and Sheep mountain road will run to a point within 16 or 18 miles of Bonanza, thus adding another feasible route to and from the district besides the Ketchum and Challis road.

#### MONTANA.

**GRANITE.**—Phillipsburg Mail, March 12: The output of the Granite for the week ending March 3d was 60,277.81 ozs. fine silver and 36.84 ozs. gold. The output of mill and mine continues steady and undiminished.

**SAN FRANCISCO CON.**—The sinking of the shaft continues and the sump is rapidly nearing the 400-foot level, at which point it is the intention of the company to drive exploratory levels east and west along the vein to explore the property in the most thorough manner. The pitch of the vein as determined by its hanging-wall is now more uniform, and the indications which in this formation sometimes point the approach to a rich ore body are numerous and promising. Trouble is being experienced with bad air in the tunnel, and we are unable to say whether at this moment work in that level is being prosecuted or not. The blower was placed in position last week.

**WEST GRANITE.**—The Butte crosscut is in 480 feet from the point of taking cover. The ground at the header is hard granite, though the flow of water is considerable and the progress made is very fair. At the 400-foot level of the Rattlesnake the east drift is in a distance of 395 feet in a wide loose vein, carrying streaks of low-grade ore running in stringers and constantly varying in size and quality. The flow of water continues unabated, but causes no further trouble, owing to the extra pumps now in use.

**SMELTHER IMPROVEMENTS.**—Anaconda Review, March 15: The improvements at the Smelter are being prosecuted with increased energy. The past

week the work of putting in new Ball stamps, to supply the places of the Cornish rolls at the old concentrator, is well under way. The company have the frames up of a number of cottages at the lower works for the use of their employees, and will soon have a number of cottages at the upper works. An addition at the upper works to smelter No. 2 is entirely completed and two more matting furnaces are thereby added to the smelting plant, giving the company 28 matting furnaces at the upper works. The amount of lumber and material now being received and the additional force which has been put on indicate that the company will far eclipse all previous efforts this season.

#### NEW MEXICO.

**HERMOSA.**—Black Range, March 16: The Dora, the next claim west from the Argonaut-Consolidated, has been leased to Socorro parties. George Beebe has taken a lease on the Antelope, and is getting out good ore from the north workings. The adit on the Favorite, on Yuma mountain, shows a quartz and lime vein full of mineral dipping into the mountain with an easy slope. The Atlantic Cable strike still continues to show well along the east side of the west drift, and test workings driven into this ore face show it to be continuous. A new adit has been started on the Contact mine, just below the falls of the Rio Palomas, and on the north side of the river. The old adit on the south side is about 40 feet into the hill. Kirk & Terry, the lessees on the Argonaut-Consolidated, have made a fine strike of high-grade ore in the winze in the west drift from the main adit, the ore is dipping down into the lime and a winze has been started to follow it. Assays from this ore give returns of 512 and 286 ounces silver to the ton. The progress made by Messrs. Jarrett & McRae in taking out high-grade ore from the Palomas Chief is most flattering. The ore coming out will run fully as high as that before the shut-down last September, which gave 323 and 429 ounces in silver to the ton in carload lots. The mine is worked night and day.

#### OREGON.

**WATER SCARCITY.**—Jacksonville Times, March 16: Miners have had a fair run, but in many places water is light. Mr. Kieslin has put up a mill at the quartz ledge in Murphy district, which he has bonded. The prospecting of the Mountain King mine on Powell's creek, Josephine county, has been resumed. Sherer & Jolson of Grant's Pass, who are interested in the Whiskey creek mines, have some fine specimens of gold, taken from them, at their store. They have their property thoroughly opened now and expect to do well in a short time. Green Bros. are still prospecting their quartz mine in Galice creek district with excellent prospects. They have had some of their tailings assayed and received favorable returns and an offer to purchase them recently.

#### UTAH.

**MINES OF STAR AND MILFORD.**—Cor. Salt Lake Tribune, March 16: The mines throughout Star and the surrounding districts still keep up their lick, and considerable ore will be shipped this spring and summer if lead keeps up, and with the hope that silver will advance, many claims that now lie idle will be worked. South and west of us are many discovered claims now lying idle waiting for a railroad, and many are yet to be discovered. With a little money judiciously used in prospecting and exploring old and abandoned claims, good results, I am sure, would follow, for claims that would not pay a few years ago would pay now, under good management, such as copper and low silver-lead mines. Those that remain here are now too poor to do much deadwork or work on claims that there are no immediate results from. Still every day new developments are taking place in those that are being worked to justify a more extensive working of claims in Star district. Considering the small number of men now working in Star district, and the amount of ore shipped in the past six months, it speaks well for the district and the miners who stay with it. Star district has been a camp since 1871, and looks as well, if not better, to-day than it ever did. All the claims that Mr. Campbell leased have paid a fair remuneration to the lessee. West of us, in San Francisco district, are many claims that should be worked, for they look well, but need capital to open them up. Marble, copper, sulphur and copper deposits are now lying idle, awaiting capital to take hold. Considerable ore is now coming in from Piche, Bullion and Bristol, and are received by the Utah Consolidated Forwarding Company.

**PARK NOTES.**—Park Record, March 17: The Anchor drain tunnel is now in nearly 3000 feet and 100 feet per week is the average distance driven. It is understood that R. C. Chambers will succeed John J. Daly as superintendent of the Daly mine and mill. As soon as the Ontario No. 2 shaft is put in better shape, drifting on the vein will be commenced from a new point, the 1200 level. Wm. McKay was up from Salt Lake the first of the week on business connected with the Massachusetts company. It was learned that his company was sufficiently satisfied at the indications as to contemplate the sinking of the shaft 200 feet further.

**ORE AND BULLION SHIPMENTS.**—During the week the Crescent shipped 120,000 pounds of first-class ore. For the week just ended the Mackintosh sampler received 182,160 pounds of Ontario ore; 269,470 of Daly and 45,570 of Sampson ore; total, 397,190 pounds. Last Monday eight bars of Daly bullion, 9255 fine ounces of silver, were shipped from the Marsac mill, and on Thursday another eight bars, 9002 fine silver ounces were shipped. The first of the week the Ontario shipped 34 bars of bullion, containing 20,987.28 fine ounces of silver.

#### WASHINGTON.

**THE DRILL IN MOTION.**—Ellensburg Capital, March 15: On Monday the drilling for gas or oil was begun at Cle-elum. Everything is in ship-shape, and the drill will go steadily down until it taps one or the other of those valuable adjuncts to human convenience and the industries of the world. Two thousand feet or more will be bored, if necessary, though the general opinion of old oil and gas men is that one-half of that distance will prove successful.



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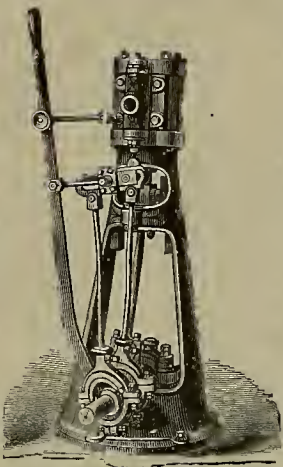
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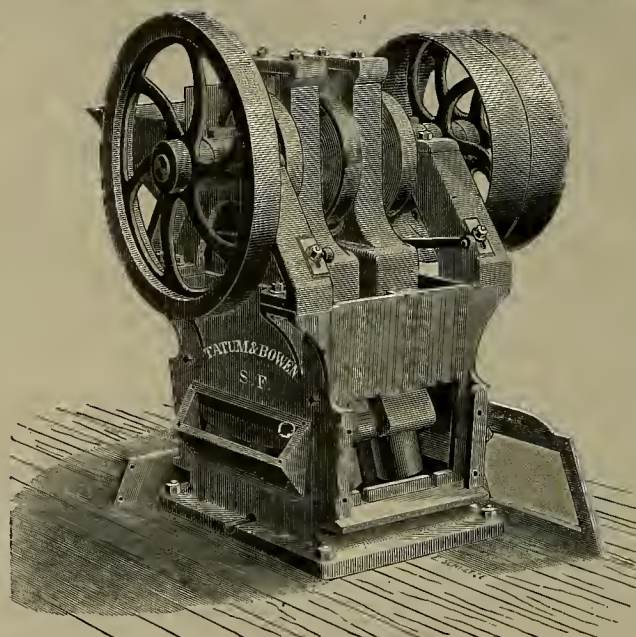
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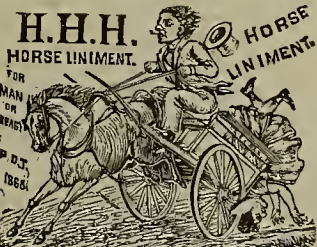
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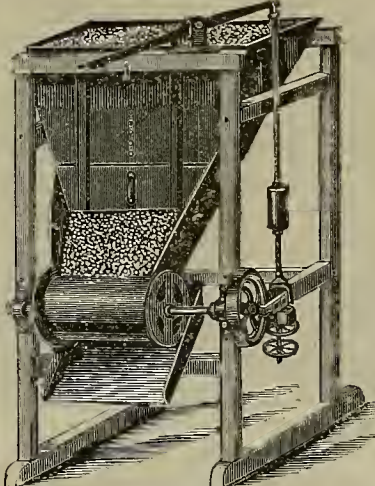


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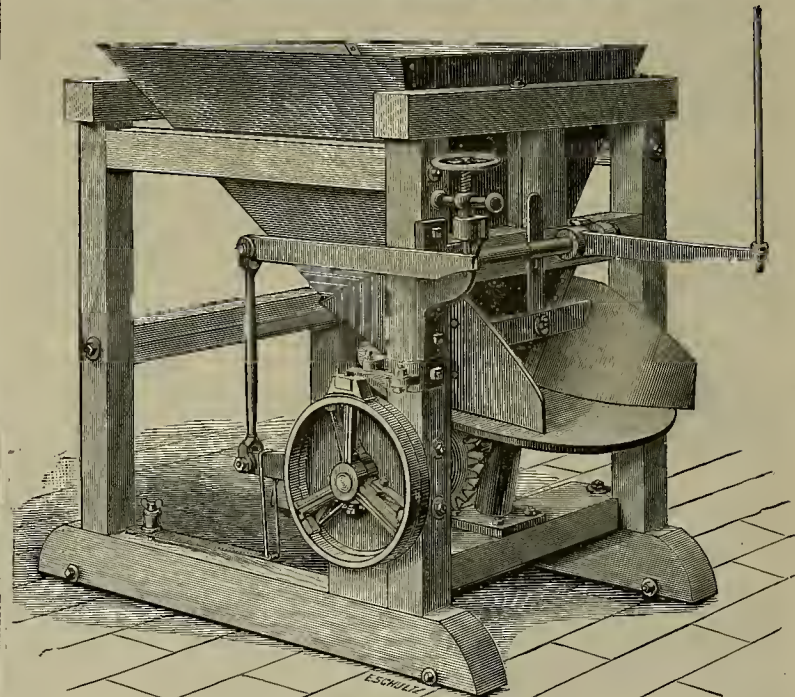
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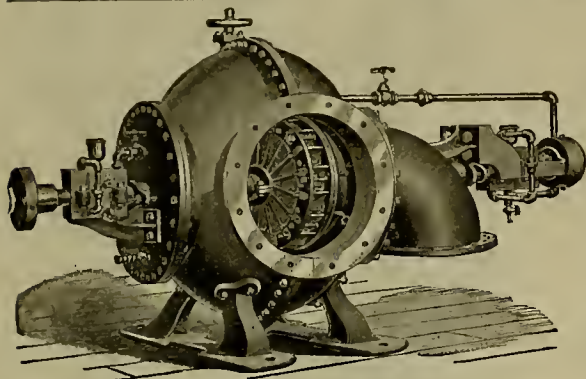
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THE AMERICAN WELL WORKS,  
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## THE GIANT POWDER COMPANY

Manufacture Three Kinds of Powder, which are acknowledged by all the Great Chemists of the World as The Safest and Strongest High Explosives in the Market.

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NOBEL'S EXPLOSIVE GELATINE, which contains 94 per cent of Nitro-Glycerine, and GELATINE-DYNAMITE, Stronger than Dynamite and even Safer in Handling.

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FOR RAILROADS AND LAND CLEARING. Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

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We would call the attention of Assayers, Chemists, Mining Companies, Milling Companies, Prospectors, etc. to our full stock of Balances, Furnaces, Muffles, Crucibles, Smelters, etc., including, also, a full stock of Chemicals.

Having been engaged in furnishing these supplies since the first discovery of mines on the Pacific Coast, we feel confident from our experience we can well suit the demand for these goods, both as to quality and price. Our New Illustrated Catalogue, with prices, will be sent on application.

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Plans and Specifications furnished for the most suitable Process for Working Ores.  
Special attention paid to Examinations of Mines; Plans and Reports furnished.  
C. A. LUCKHARDT & CO.,  
(Formerly Huhn & Luckhardt,  
Mining Engineers and Metallurgists

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Ores Sampled and Assayed, and Tests made by my Process.  
Assaying and Analysis of Ores, Minerals and Waters.  
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Practical Instruction given Treating Ores by improved processes.  
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**THE RUSSELL PROCESS COMP'Y.**  
C. A. STETEFELDT, President.  
NEW YORK OFFICE, 18 BROADWAY  
Room 709.



News in Brief.

They are using crude petroleum as fuel for burning bricks at Pasadena.

One day last week there were landed at New York 2262 immigrants, most of whom are bound West.

A MEMORIAL to Congress has been prepared, urging the necessity of a quarantine station at this port.

The wire cable for the new Powell-street line in this city is 26,680 feet long and weighs 48,500 pounds.

RIVERSIDE is likely to have a motor road to Colton, before long, connecting with the line to San Bernardino.

SEVERE earthquakes have been experienced in Yunnan, China, and at one place some 4000 people were killed.

The House Committee on Territories has decided to report the bill for the organization of the Territory of Alaska.

The U. S. Supreme Court has rendered a decision in the telephone case, giving a verdict in favor of the Bell patent.

ARRANGEMENTS have been made looking to the establishment of a line of freight ships between Australia and Portland direct.

The Ontario Land & Colony Co. celebrated the fifth anniversary of the inaugural improvements of their colony on the 17th inst.

CONGRESS will probably authorize the placing of certain beacon lights at prominent points on the Sacramento and San Joaquin rivers.

SECRETARY BAYARD has recommended the President to appoint Jas. V. Coleman as Chief Commissioner to the Melbourne Exposition.

The new Hotel del Monte is finished and has over 400 guests, including distinguished people from the Eastern States, Canada and Europe.

AT Ubita, San Bernardino county, last week, an artesian well at the depth of 175 feet struck water which sends a stream 40 feet in the air.

GORDON HUGHES, an Ohio boy, son of the American Consul at Birmingham, has won, in competition with 52 others, a Cambridge scholarship worth \$2000.

The Railroad Commissioners are inquiring into the condition of affairs by which the California Southern is charging slightly higher rates of fare than other lines in that part of the State.

The Board of Trustees announce that the Twenty-third Industrial Exposition of the Mechanics' Institute will open Tuesday, Aug. 7, and will close on Saturday evening, Sept. 15, 1888.

EXPORTS of wine from this port, from January 1st to March 1st, were 938,800 gallons, of an approximate value of \$414,000, against \$31,200 gallons valued at \$366,000 in the same time last year.

The Supervising Architect of Public Buildings at Washington has recommended to the Secretary of the Treasury that \$40,000 be appropriated for the repair of public buildings in San Francisco.

NEVADA local hunters say that the cold wave which swept across Western Nevada last January killed all the rabbits and thinned the ranks of the badgers and coyotes formerly so numerous on the desert.

The War Department has issued an order for the abandonment of the military reservation at Carlin, Nev. It will be turned over to the Interior Department and steps will be taken for its sale as public land.

SENATOR DOLPH has introduced a bill to authorize the construction of a railway bridge over Clear Water river in Idaho, and for the Navigation Company to build a bridge over Snake river, at Texas Ferry, W. T.

NOT all the immigrants from Europe come to us. There are 21 companies running regular lines of steamships between Buenos Ayres and various European ports. Immigrants are thronging to New Zealand and Australia.

PARTIES visiting the volcano of Popocatepetl recently, report an increasing activity in the crater, with clouds of smoke and sulphurous fumes. Reports from Central America show that several volcanoes are unmistakably in renewed activity.

HORSE-STEALING by a thoroughly organized gang has been going on in Los Angeles county for several months past, and it is estimated that \$100,000 worth of animals have been run away with. The officers of the law have so far been baffled by the thieves, and the sheriff has called police detectives to his assistance.

CONTRACTS were signed by parties in Fresno, and a man has gone to North Carolina to ship to that country 300 negro families. Most of these will replace Chinese in the orchards and vineyards. It is said that the women and children in vineyards do better than Chinamen, while the men in the sweat and drying houses learn the business of curing raisins much better and faster than the Chinese.

DAIRMEN of Missouri have sent the U. S. Senate a strong petition in favor of removing the duty on foreign salt. The petitioners claim that the tariff does not have the effect of improving the quality of home salt, while the tax falls directly on dairymen who need the best quality of English salt in the manufacture of butter and cheese. It is pointed out that a salt trust prepared by American manufacturers is designed to increase the burden.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING MARCH 13, 1888.

- 379,441.—SNOW PLOW—L. J. Bergendahl, Pendleton, Ogn.
- 379,366.—MAPS—W. M. Bours, Stockton, Cal.
- 379,501.—SWITCH FOR ELECTRIC-LIGHT CIRCUITS—Brann & Kinney, S. F.
- 379,306.—OPERATING CABLE RAILROADS—Clement & Watriss, S. F.
- 379,372.—NON-POLARIZING CONSTANT CURRENT BATTERY—F. J. Crouch, Eugene City, Ogn.
- 379,512.—WINDMILL—S. M. Fulton, Galt, Cal.
- 379,399.—RAILROAD TIE—Jes. Jacobs, S. F.
- 379,319.—POCKET RECEPTACLE—S. Mendleson, Los Angeles, Cal.
- 379,348.—SEAL LOCK—Waldron & Boiler, Folstein, Cal.
- 379,428.—STATION INDICATOR—J. W. Warburton, S. F.
- 379,432.—COMBINED CHAIR, FISH-PLATE AND RAIL COUPLER—W. Wilt, Eureka, Cal.

NOTE.—Copies of U. S. and Foreign Patents furnished by DEWEY & CO., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

NON-POLARIZING CONSTANT-CURRENT BATTERY.—Frank J. Crouch, Eugene City, Oregon, No. 379,372. Dated March 13, 1888. This improved voltaic battery consists of a jar containing a leaden coil-wheel which is connected with one binding-screw, a zinc plate which is connected with the opposite binding screw, the two being separated and surrounded by sand, which is tamped in, and both of them lie above a hedy of sulphate of copper, which is placed on the bottom of the jar, while above the whole a mixture of sand and salt is tamped, and the whole is covered with a concave perforated cap of plaster of Paris, tenacious clay, or other closing material. The object of the sand is to keep the metal clean and cause a greater steadiness in the chemical action and prevent all bubbles or deposits from accumulating, so as to weaken the action, which is common in ordinary batteries. The absence of any liquid and the solidity with which the parts are secured together make it a valuable battery to ship or move about. To set this battery up for use the operator simply pours the concave basin on the top full of water and allows it to stand four or five hours, with the poles or binding-screws connected, and the water will gradually percolate through the packing to the bottom. If the battery prove not strong enough, more water may be poured in after the first has been absorbed until no more can be absorbed by the battery. This battery will then work for several weeks without any care and if it becomes weak after a time it may be enlivened by placing a tablespoonful of solution of sulphate of zinc or copper in the basin, so that it will flow down into the interior. The battery may be used in the same manner with other batteries, being coupled up either for quantity or intensity. The inventor of the battery is quite a young man, who has distinguished himself by producing several other original inventions.

RAILWAY TIE.—Joseph Jacobs, S. F. No. 379,399. Dated March 13, 1888. This railway tie or sleeper has a metallic case or frame filled with concrete, asphaltum concrete or cement, or any similar substance originally plastered, but which hardens and forms the body of the tie, and is protected by the metallic case. The invention also consists in a metallic case or frame made of a single piece of sheet metal and fashioned into an elongated box-shape having a bottom, sides and ends, this case or frame being filled with a suitable strengthening material forming the body of the tie. The object of the invention is to provide a cheap and durable tie for railroad purposes.

Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Oons. California and Virginia, March 17, \$99,876; North Belle Isle, 18, \$20,000; Alice, 14, \$22,640; Pollock, 14, \$10,688; Lexington, 14, \$28,792; Moulton, 14, \$24,800; Hanauer, 15, \$23,500; Crescent, 15, \$32,500; Germania, 15, \$9777; Hanauer, 16, \$2200; Germania, 16, \$2530; Queen of the Hills, 17, \$1077; Hanauer, 17, \$1775; Germania, 17, \$4767; Queen of the Hills, 17, \$1075.

Don't Fail to Write.

Should this paper be received by any subscriber who does not want it, or beyond the time he intends to pay for it, let him not fail to write us direct to stop it. A postal card (costing one cent only) will suffice. We will not know fully until the paper to anyone who does not wish it, but if it is continued through the failure of the subscriber to notify us to discontinue it, or some irresponsible party requested to stop it, we shall positively demand payment for the time it is sent. LOOK CAREFULLY AT THE LABEL ON YOUR PAPER.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

ASSESSMENTS.

COMPANY.	LOCATION.	Nb. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Andes M. Co.	Nevada.	5.	05. Feb 23. Apr 1.	Ap 27. J. M. Quay.	406 Montgomery St
Alaska M. Co.	California.	10.	10. Feb 21. Mar 20.	Ap 10. A. Judson.	320 Sansome St
Belcher M. Co.	Nevada.	34.	50. Mar 13. Apr 17.	May 7. J. Crockett.	327 Pine St
Bodie M. Co.	California.	4.	50. Feb 13. Mar 20.	Ap 25. G. W. Sessions.	309 Montgomery St
Champion M. Co.	California.	23.	10. Feb 14. Mar 19.	Ap 18. T. Wetzel.	522 Montgomery St
Orinda M. Co.	California.	2.	10. Mar 7. Apr 15.	May 1. P. H. Leonard.	528 Montgomery St
Crocker M. Co.	California.	5.	25. Feb 15. Mar 27.	May 1. A. Waterman.	309 Montgomery St
Calaveras Blue G. M. Co.	California.	1.	05. Feb 23. Mar 19.	Ap 9. B. Burris.	309 Montgomery St
Day M. Co.	Nevada.	18.	1.00. Feb 8. Apr 9.	May 7. R. R. Grayson.	327 Pine St
Excelsior M. Co.	Nevada.	25.	20. Feb 7. Mar 17.	Ap 4. C. J. Elliott.	339 California St
Equitable Tunnel Co.	Utah.	33.	15. Feb 14. Mar 9.	May 9. C. J. Collins.	1018 Market St
Found Treasure M. Co.	Nevada.	2.	05. Jan 31. Mar 3.	May 23. J. Stoddard.	419 California St
Gould & Curry M. Co.	Nevada.	58.	50. Mar 12. Apr 17.	May 10. A. K. Durlrow.	309 Montgomery St
Gray Eagle M. Co.	California.	8.	14. Mar 8. Apr 10.	Ap 3. T. Wetzel.	522 Montgomery St
Golden Fleece G. M. Co.	California.	12.	7.00. Jan 28. Mar 15.	Ap 10. W. J. Clouston.	310 Thelma Building
Humboldt M. Co.	Idaho.	3.	05. Feb 3. Mar 19.	Ap 13. W. L. Oliver.	323 Montgomery St
Keyes M. Co.	Nevada.	1.	20. Feb 15. Mar 20.	Ap 16. H. Deas.	309 Montgomery St
Kennedy M. Co.	California.	3.	10. Feb 20. Apr 2.	Ap 28. L. F. Reeling.	404 Montgomery St
Live Oak Drift O. M. Co.	California.	8.	10. Feb 13. Mar 20.	Ap 14. T. Wetzel.	522 Montgomery St
Livermore Oil Co.	California.	1.	05. Mar 8. Apr 8.	Ap 28. H. Deas.	309 Montgomery St
Phil Sheridan Con. M. Co.	Nevada.	3.	10. Mar 7. Apr 14.	May 3. T. F. Holling.	353 Kearny St
Pittsburg M. Co.	California.	20.	75. Feb 14. Mar 17.	Ap 18. C. J. Bandmann.	33 California St
Spring Valley O. M. Co.	California.	2.	50. Jan 11. Mar 17.	Ap 18. H. Pichor.	320 Sansome St
S. F. Copper Co.	Nevada.	2.	40. Feb 3. Mar 10.	Ap 3. H. Pichor.	320 Sansome St
Virginia Creek Hyd. M. Co.	California.	5.	05. Feb 28. Apr 1.	May 1. M. Quay.	468 Montgomery St

MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE
Jackson M. Co.	California.	O. N. Shaw.	123 California St.	Annual.	Mar 26
Hayflower Gravel M. Co.	California.	M. Morizo.	323 Montgomery St.	Annual.	Apr 2
Mount Cory M. Co.	California.	W. L. Oliver.	323 Montgomery St.	Annual.	Apr 3

LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Corral Verde M. Co.	Nevada.	A. W. Havens.	309 Montgomery St.	50.	Apr 4
North Belle Isle M. Co.	Nevada.	J. W. Pow.	310 Pine St.	50.	Apr 5
Oregon Coal & Navigation Co.	Oregon.	R. H. Williams.	211 Sansome St.	1.50.	Mar 2
Pacific Horax, Salt & Soda Co.	California.	A. H. Clough.	330 Montgomery St.	1.50.	Mar 10
Russell Reduction & M. Co.	California.	J. R. Morizo.	309 Montgomery St.	45.	Sept 17
San Francisco Copper M. Co.	California.	F. E. Berler.	320 Sansome St.	1.40.	Sept 19
Standard Con. M. Co.	California.	J. W. Pow.	310 Pine St.	10.	Apr 12

San Francisco Metal Market.

WHOLESALE. THURSDAY, MAR. 22, 1888.

ANTIMONY—French Star.	94 @	—
COPPER—		
Bolt.	26 @	30
Sheeting.	20 @	—
Ingot.	10 @	18
Pigs.	—	28
Pine Box Sheets.	—	30 @ 50
IRON—Hogwarts & Co.		
England, ton.	—	28 @ 30
American Bolt, No. 1, box.	—	33 @ 30
Oregon Pig, ton.	21 @	23 @ 30
Oregon White.	—	30 @ 30
Shells, No. 1.	—	31 @ 30
LEAD—Pig.	5 00 @	5 50
Bar.	5 25 @	5 50
Sheet.	5 00 @	—
Shot, discount 10% on 500 bag.	2 00 @	—
Back, 3 bar.	2 00 @	—
Chilled, do.	2 00 @	—
STEEL—English, lb.	10 @	25
Black Diamond, ordinary sizes.	9 @	—
Flow.	4 @	5
Naylor & Co.	10 @	16
TIN PLATE—Ooko.	5 75 @	6 50
Charcoal.	6 75 @	7 25
QUICKSILVER—By the flask.	1 05 @	—
Flasks, new.	40 @	42 @ 50
Flasks, old.	85 @	—
BORAX—Harmony.	—	71 @
Powdered.	—	71 @
Concentrated.	—	71 @

New York Metal Market.

Telegraphic advices dated Mar. 22d give the following New York prices:—94 1/2 per oz. BAR SILVER—94 1/2 per oz. BORAX—94 @ 100. COPPER—LARS—\$16.00 @ —. IRON—No. 1, \$22.00. LEAD—\$5.00 @ 124. TIN—\$15.50 @ —.

The following is the latest by mail from the "New York Metal Exchange Market Report": COPPER—Quiet, spot closing at \$10.00 @ 10.10. Transferable Notices (Lake) issued at \$10.30 @ —. LEAD—Steady at \$5.07 @ 5.20 spot. Transferable Notices issued at \$5.00. TIN—Quiet at \$38.50 @ 37.00. Transferable notices issued at \$31.50 @ 32.50. Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt deliveries. Australian Tin, \$36.00 @ 36.25; Billiton Tin, \$37.50 @ —; Banca Tin, \$38.00 @ —; Baltimore Copper, \$15.25 @ 15.50; Orford Copper, \$15.75 @ 16.00; P. S. O. Copper, — @ —; Foreign Lead, \$5.40 @ 5.50; Foreign Spelter, \$8.10 @ 8.30. Antimony, \$11.50 @ 15.00.

Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send one but worthy man.

JOHN O. H. LAMPADIER—S. L. Obispo & S. Barbara Co.'s. O. W. INGALLS—Arizona Territory. W. M. WILKINGS—Fresno Co. A. F. JEWELL—Yuba and Sutter Co.'s. C. E. WILLIAMS—Yuba and Sutter Co.'s. R. C. HUSTON—Montana Territory. E. H. SCHARFF—Calaveras and Sacramento Co.'s.

MESSRS. ROSS are about to build at their shipyard on Ithmus slough, on Coos bay, a steam schooner for a Santa Cruz company. The new vessel will be furnished with a Corliss engine, use petroleum for fuel, and her mainmast will be of iron and serve also as a smokestack. She will have a carrying capacity of 300,000 feet of lumber.

W. H. OHMEN, who has been for some years established at No. 12 Fremont street, has moved to No. 107 on the same street. The vertical and horizontal engines made by Mr. Ohmen have made splendid records, and all those in use in this city are pronounced great economizers of fuel.

THE PACIFIC BUSINESS COLLEGE in this city is the best known institution of its kind in the West. A diploma from this college is the best possible recommendation for a person in search of a position in any of the great business houses, as it is recognized everywhere.

ENOCH P. ROWE, superintendent of the Josephine mine at Volcanoville, which is owned by Joseph Nougues of this city, has disappeared. About \$6000 in bullion and amalgam is also missing.

Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING MAR. 1.	WEEK ENDING MAR. 8.	WEEK ENDING MAR. 15.	WEEK ENDING MAR. 22.
Alpha.	2.00	2.65 3.20	2.75 3.20	3.90 2.80 3.30
Alta.	2.10	2.10 2.65	2.20 2.20	2.45 2.05 2.30
Andes.	1.20	1.40 1.35	1.70 1.50	1.60 1.35 1.60
Argentina.	.15	.20 1.15	.20 1.25	.20 1.25 .20
Bodie.	54	61 6.50	71 6.50	7.37 6.75 6.81
Prophy.	..	..	..	..
Best & Belcher.	58	6.00 7.5	8.1 6.00	6.50 5.1 6.25
Bullion.	1.40	1.90 1.70	2.25 2.30	2.50 2.35 2.35
Baltimore.	1.05	1.75 1.30	1.70 1.15	1.02 2.05 1.02
Challenger.	.65	.70 60	.65 60	.65 60 60
Bodie Con.	2.15	2.35 2.25	2.60 2.30	2.55 2.15 3.75
Benton.	..	3.05	3.50 4.00	4.25 3.10 3.75
Bodie Tunnel.	..	..	..	..
Bulwer.	..	75	80 1.10	1.15 75 1.05
Con. Va. & Cal.	142	15 15	17 14	15 15 15
Challenge.	68	102 123	124 154	154 154 154
Champion.	..	..	..	..
Chollar.	5.25	5.75 5.1	6.8 6.00	6.50 5.75 8.25
Confidence.	324	45 25	52 45	50 34 50
Con. Imperial.	2.80	5.75 3.00	6.7 7.00	8.25 5.75 8.00
Ocalonia.	40	65 50	75 75	85 65 80
Con. Pacific.	..	..	30	..
Crown Point.	0.25	8.75 6.00	7.8 6.82	7.50 6.4 7.00
Crocker.	.45	.50 50	.55 80	.75 60 7.00
Central.	..	..	..	..
Dudley.	..	..	..	..
East B. & B.	101	111 91	111 102	111 102 111
Excelsior.	1.05	1.40 1.20	1.4 2.05	2.35 1.35 2.40
Grand Prize.	2.00	2.05 2.00	2.05 ..	2.02 1.20 2.15
Gould & Curry.	4.20	4.60 4.45	4.95 4.2	5.4 4.50 5.00
Hale & Norcross.	94	92 104	112 104	111 104 111
Holmes.	..	..	2.40	..
Independence.	..	..	..	..
Iowa.	.25	.40 60	1.00 1.10	1.15 1.10 1.10
Julia.	..	55 80	70 70	70 70 70
Justico.	85	1.00 1.05	1.20 1.35	1.60 1.50 1.60
Kentuck.	2.25	2.50 2.30	2.50 2.50	2.50 2.50 2.50
Lady Wash.	.40	.50 45	.60 40	.85 45 45
Martin White.	1.80	1.90 1.90	2.10 2.1	2.10 2.25 2.25
Mono.	..	..	..	..
Mexican.	54	5.50 61	8.50 8.00	8.02 5.75 6.10
Nevada.	4.00	..	4.00	4.00 4.00 4.00
Northern Belle.	..	..	..	..
Navajo.	1.70	1.75 1.65	1.75 1.70	1.75 1.85 1.75
North Belle Isle.	7.25	7.50 7.00	7.50 8	6.75 8 8
Niagara.	3.41	3.80 3.20	3.80 3.30	3.50 2.35 3.40
North G. & O.	..	..	..	..
Ocalonia.	1.50	1.55 1.65	1.80 2.40	3.00 1.75 2.40
Ophir.	0.75	1.00 1.1	1.1 1.1	1.02 1.10 1.10
Overman.	2.10	2.30 2.30	3.00 2.55	3.20 2.60 2.60
Pacific.	1.30	51 51	50 50	50 50 50
Peerless.	1.35	1.25 1.50	1.50 1.40	1.65 1.20 1.40
Peer.	.50	.55 50	.70 60	.65 65 65
P. Sheridan.	.05	.10 ..	.. ..	.. ..
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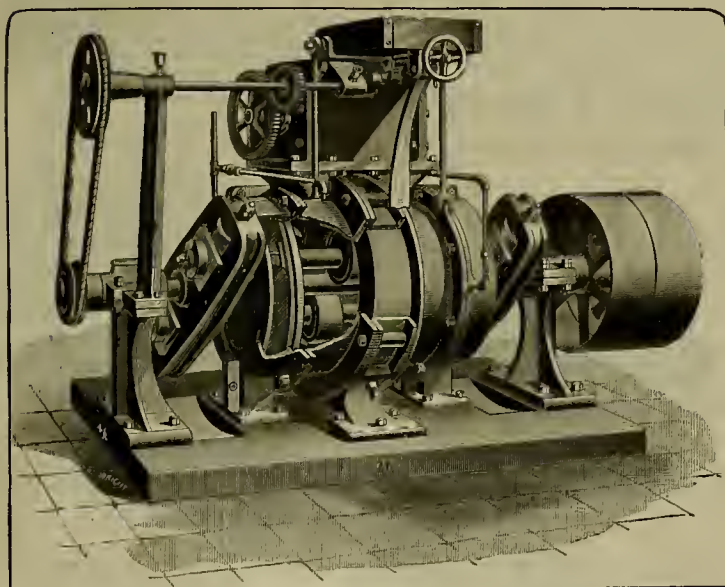
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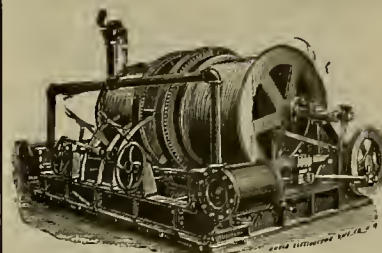
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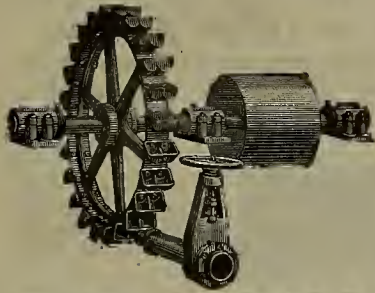
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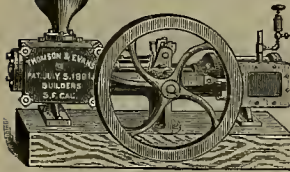
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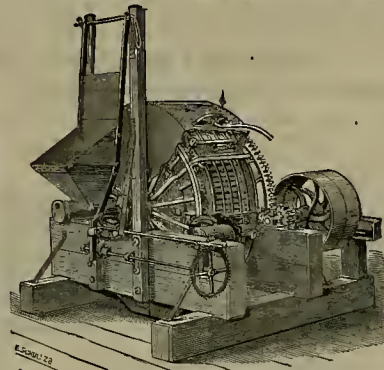
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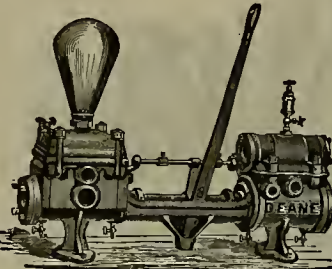
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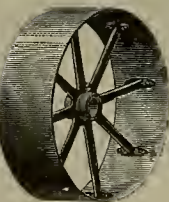
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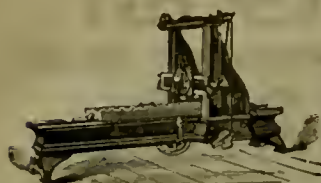
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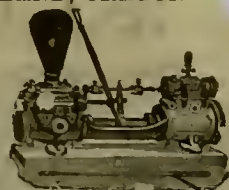


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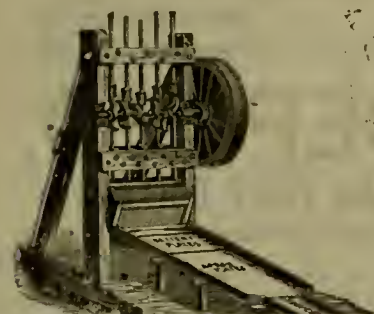
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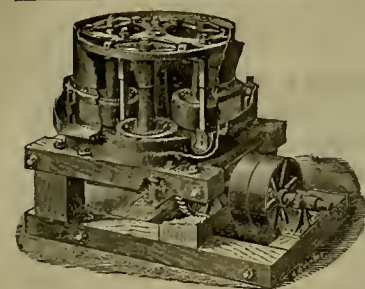
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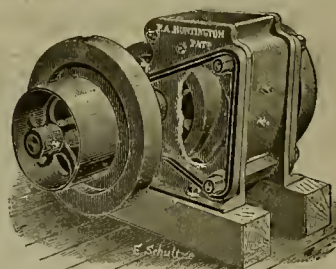
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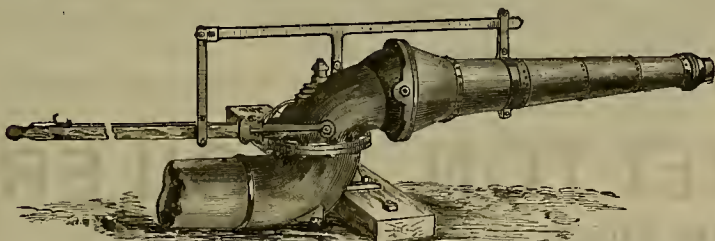
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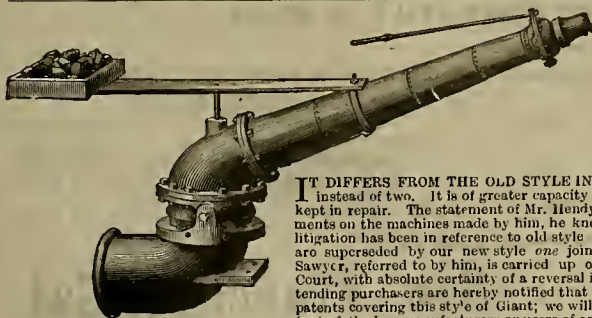
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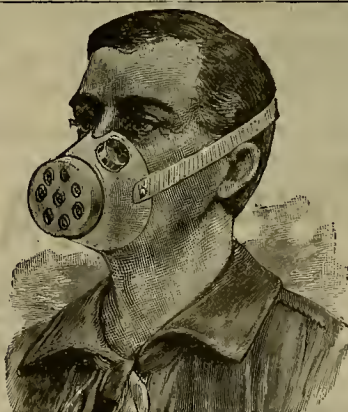
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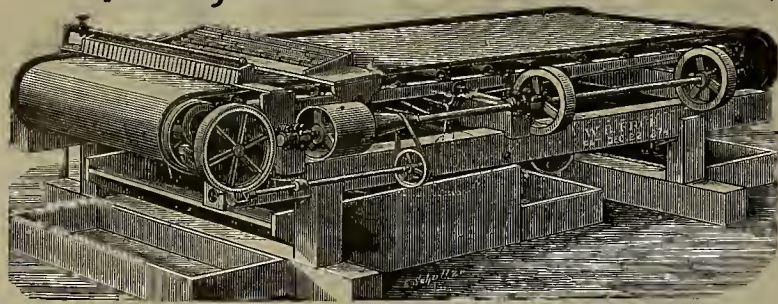
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Blacksmith's Tongs, Wrought Iron, 18 inches, Weight, 2 lb.	Blacksmith's Cold Chisel, 1 1/2 lbs. Steel.	Blacksmith's Hot Chisel, 1 1/2 lbs. Steel.
		Blacksmith's Drill Press, Hand Fed, Weight, 50 lbs.

THE FOOS MFG. CO., Springfield, Ohio.



# \$1,000 CHALLENGE!



**THE FRUE ORE CONCENTRATOR  
OR VANNING MACHINE.**

**PRICE: FIVE HUNDRED AND SEVENTY-FIVE DOLLARS  
(\$575.00) F. O. B.**

OVER 1400 ARE NOW IN USE. Concentrations are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

THE MONTANA COMPANY (Limited), LONDON, October 8, 1885. J.W.

DEAR SIR:—Having tested three of your Frue Vanners in a competitive trial with other similar machines (Triumph), we have satisfied ourselves of the superiority of your Vanners, as is evidenced by the fact of our having ordered twenty more of your machines for immediate delivery. Yours truly,

THE MONTANA COMPANY (Limited).

N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

ADAMS & CARTER.

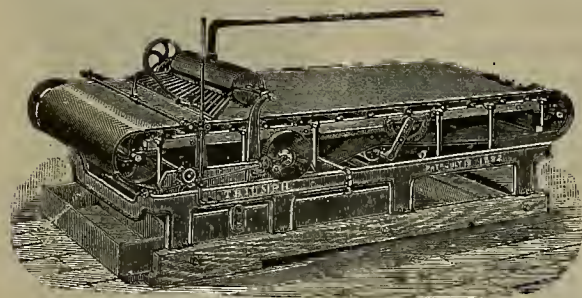
Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1885. Patents applied for.

ADAMS & CARTER, Agents Frue Vanning Machine Co.,

Room 7, No. 109 California Street,

SAN FRANCISCO, CAL.

# \$1,000 CHALLENGE ACCEPTED, PRICE, FIVE HUNDRED AND FIFTY DOLLARS (\$550.00).



**THE  
"TRIUMPH" ORE CONCENTRATOR.**

The present improved form of the celebrated "TRIUMPH" Ore Concentrator possesses many advantages over any other style of Vanners, Vanning Machines, or Concentrators, yet introduced to the notice of mining men. These advantages consist in the superior features which enter into their construction, and facilitate their operation.

They are constructed in the best manner; their frames being of iron, insures their solidity, durability, and perfect steadiness of motion when operated. They are built as compactly as their requisite strength will permit, weigh less, require less freight space in boxes, by which their cost of transportation is reduced, and occupy less mill room when set up.

An important improvement has recently been introduced into their construction, which consists of a RIFLE TABLE placed in front of and which takes the discharge from the feed and amalgam bowl. The improvement is in the reciprocal motion which is imparted to this table by the longitudinal motion of the shaking frame to which the table is attached. We have at hand many testimonials, from well-known Superintendents of mines in different mining districts of the United States, bearing evidence of the efficiency and superiority of this form of Concentrator, and we shall be pleased to send Circulars covering such letters of testimony, and, as well, directions for setting up and operating these machines, and are ready to quote special prices for any considerable order.

JOSHUA HENDY MACHINE WORKS,

Nos. 39 to 51 Fremont St.,

San Francisco, Cal.

WM. H. TAYLOR, President.

R. S. MOORE, Superintendent.

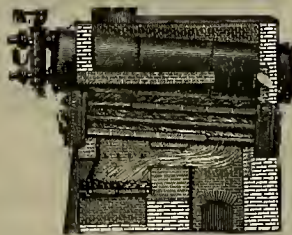
L. R. MEAD, Secretary.

# RISDON IRON & LOCOMOTIVE WORKS

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Manufacturers and Sole Agents for the Pacific Coast for

## HEINE SAFETY WATER TUBE BOILER.



Has the Following Advantages:

**SAFETY,  
DURABILITY,  
ECONOMY,  
AND FACILITY OF INSPECTION AND REPAIRS.**  
60,000 Horse Power now in use.

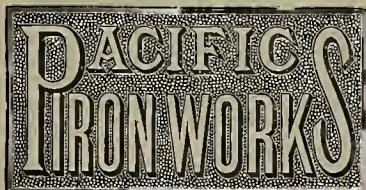
Boilers can be seen working in San Francisco at Palace Hotel, Spring Valley Water Works, Hueter Bros. & Co., California Jute Mills, and other places.

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QUARTZ MILLS—Gold and Silver, Copper and Lead Smelting Works, Roasting Furnaces of all kinds.  
AIR COMPRESSORS—Rope Power Transmission.  
HYDRAULIC PUMPING and Hoisting Machinery.  
WROUGHT-IRON WATER PIPE a Specialty. Note.—Have just completed order for 35 miles of 44-inch pipe of 4-inch iron for Spring Valley Water Works Company, San Francisco.  
SAW-MILL MACHINERY of all kinds.  
STEAM ENGINES—Corliss, Slide-Valve, Poppet Valve Automatic, Single, and Compound.  
SOLE MANUFACTURERS for Pacific Coast of the Celebrated "Heine" Patent Safety Boiler (Water Tube); 50,000 horse power now in use.  
MACEBETH PATENT STEEL-RIM PULLEYS—Fifty per cent lighter and 25 per cent cheaper than cast-iron pulleys; will not break in transportation.

REFRIGERATING MACHINERY for Steamships, Breweries, and Cellars.  
WILSON'S PATENT GAS-PRODUCER.  
STEAM BOILERS of all descriptions.  
SUGAR MACHINERY—Sugar Mills, Vacuum Pans, Clarifiers, Double Effects, etc.  
STEAMSHIPS—Steam Yachts, Marine Engines and Boilers, Screw Propellers, Centrifugal Pumps, Steamship Pumps, Steam Capstans, Cargo Winches, etc.  
Builders of 120-stamp Gold Mill for the Alaska Mill and Mining Company; 60-stamp Mill for Quartz Mountain Mining Company.  
Send for Circular and Price Lists.



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**RANKIN, BRAYTON & CO.,**  
...BUILDERS OF...  
**MINING MACHINERY.**

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PLANTS FOR GOLD AND SILVER MILLS, embracing machinery of LATEST DESIGN and MOST IMPROVED construction. We offer our customers the BEST RESULTS OF 35 YEARS' EXPERIENCE in this SPECIAL LINE of work, and are PREPARED to furnish from SAN FRANCISCO or CHICAGO, the MOST APPROVED character of MINING AND REDUCTION MACHINERY, adapted to all grades of ores and SUPERIOR to that of any other make, at the LOWEST POSSIBLE PRICES.

We are also prepared to CONSTRUCT and DELIVER in COMPLETE RUNNING ORDER, in any locality, MILLS, CONCENTRATION WORKS, WATER JACKET SMELTING FURNACES, HOISTING WORKS, PUMPING MACHINERY, ETC., ETC., of any DESIRED CAPACITY.

# THE HAZELTON BOILER.

A NEW AND RADICAL DEPARTURE IN

## STEAM GENERATOR.

DESTINED TO REVOLUTIONIZE ALL FORMER METHODS. A SAVING IN FUEL OF AT LEAST 25 PER CENT GUARANTEED OVER ANY OTHER STYLE OF BOILER.

The following parties have these Boilers in use or under construction on this Coast, to whom reference is made:

Spring Valley Water Works, S. F.	1 200 H. P.	Starr & Co. Mills, Wheatport.	1 100 H. P.	San Jose & Santa Clara Electric R. Co. Company.	1 100 H. P.
Southern Pacific R. R. Co., S. F.	1 75 H. P.	Selby Smelting Works, Vallejo Junction.	2 125 H. P.	San Diego Electric R. R. Co.	1 100 H. P.
California Cotton Mills, East Oakland.	1 150 H. P.	Selby Smelting Works, Vallejo Junction.	1 75 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
Harmony Borax Mining Company, Alameda.	1 75 H. P.	Oakland Gas Light Co., Oakland.	1 200 H. P.	La Luz Mining Co., Mexico.	3 75 H. P.
				Santiago Mining Company Central America.	1 60 H. P.

SEND FOR CIRCULARS.

**PACIFIC IRON WORKS, San Francisco, Cal.**



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MARCH 31, 1888.

VOLUME LV.  
Number 13.

## The T. H. Risdon Turbine Water-Wheel.

At the Centennial Exhibition in 1876 there was a test of turbine wheels, one of the most extensive ever made, and one of unusual interest because of the results, which were not at all in accordance with previously formed opinions respecting various wheels.

This was especially true of the one we are going to describe, which came almost "unheralded," and carried off the first prize against all competitors.

The Risdon water-wheel is made in New Jersey, near Philadelphia, and had earned for itself a good reputation in a limited circle, but no one expected that it would do more than secure a creditable place in the test above mentioned.

As to the efficiency at Philadelphia, 19 different wheels were tested, this Risdon giving an efficiency as follows:

	Per cent.
Full gate.....	87.68
3/4 gate.....	86.33
1/2 gate.....	82.52
1/4 gate.....	75.35

No result of the kind had ever been attained, the wheels coming next, the "National," being four per cent below, and the Geylein third, with nearly the same result as the "National."

The Laffel and other wheels best known on the Pacific Coast were not entered for tests.

At Holyoke, Mass., where there is the most complete plant known for testing turbine wheels, the Risdon maintained its record. Among 36 different wheels it stands at the head with the following efficiency:

	Per cent.
Full gate.....	91.30
3/4 gate.....	88.30
1/2 gate.....	75.60
1/4 gate.....	72.77

Of these tests, Mr. James Emerson says, speaking of the Risdon wheel: "The wheel is well made, and, I believe, gave the highest result ever yet obtained by a turbine wheel."

With this much respecting the remarkable results of this turbine, we will now give some description of its construction.

Fig. 1 is an elevation of the Risdon wheel and Fig. 2 shows an elevation of the same wheel with a "register" gate such as is commonly employed for turbines. This gate contracts the issues in the direction of their narrow width, while the cylinder gate in Figs. 3 and 4 contracts the issues in their depth instead of width, so the column assumes a square section, or approximates one, instead of a thin, vertical sheet.

Fig. 3 is a vertical section through what is called the cylinder-gate type, the one giving the highest results, and the kind mostly made at the present time. [See cont, page 201.]

The "refinement," as we may call it, and some explanation of the wheel's performance, will be seen in Fig. 4, showing the form of the vanes and the departure from ordinary practice,

the two most noticeable features being the water impinging against convex instead of concave surfaces and the provision to meet centrifugal force by the curves as seen at the issues.

This is in effect the opposite of ordinary turbine practice, yet more nearly conforms to the hydrodynamic law of surfaces at a right angle to the line of force. This form of the vanes, changing from a convex to a concave face from inlet to issue, is difficult to generate or describe, and is also difficult to represent in a drawing, and shows an example of iron casting that is remarkable. The surfaces are made perfectly

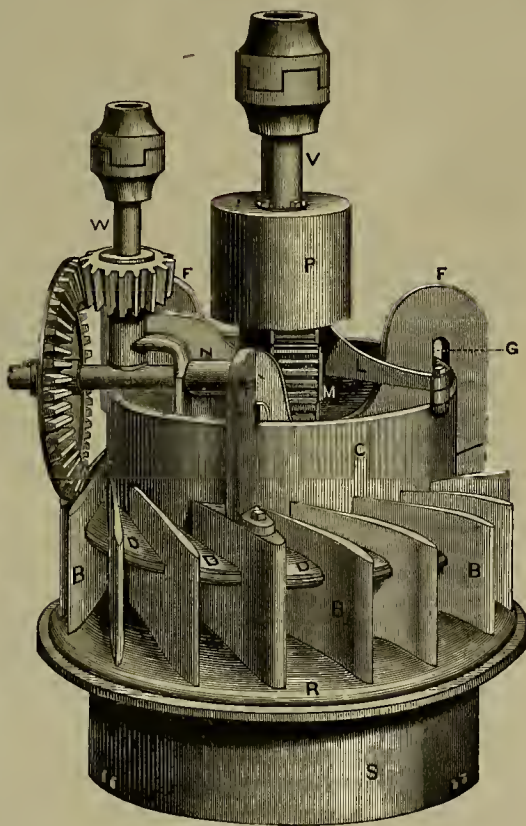


Fig. 1.—ELEVATION OF A T. H. RISDON TURBINE WHEEL.

smooth, and it is an achievement to be proud of in any foundry.

By the convex faces before mentioned it will be seen that the vanes offer to the entering water a surface normal to its course as the wheel revolves.

Fig. 5 shows an example of wheel mounting, two 20-inch wheels being inclosed in one case. We have numerous examples of mounting throughout the country, especially in New England, where most of the Risdon wheels have been erected, but cannot spare space to insert more.

Mr. J. Richards represents the Risdon wheel on this coast, and will furnish further information when wanted.

CHLORINATION WORKS are to be put up at the Buchanan mine, Tuolumne county. They will be large enough to take onstom work.

The Cœur d'Alens district is now yielding about 200 tons of lead per day.

## Natural Gas.

The discovery and utilization of natural gas in some of the Eastern States has worked a sort of industrial revolution. Its use for fuel and lighting purposes has had quite an effect on coal mining. According to estimates made by experts, the amount of coal displaced in Pittsburgh and Alleghany City alone, by the use of natural gas, is over 4,500,000 tons. The supply so far seems to be inexhaustible, and arrangements are being made to run pipe lines to some of the large cities, as in the case of Chi-

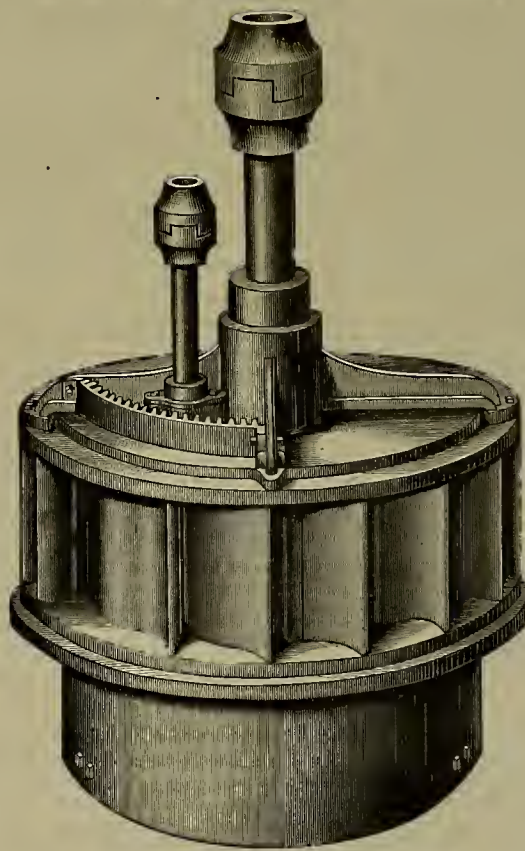


Fig. 2.—ELEVATION OF A RISDON WHEEL WITH REGISTER GATE.

cago. People have given up boring for petroleum and are searching for natural gas.

In the list of petroleum-producing States, California now stands third, and its resources in this respect are being very rapidly developed. Of late, owing to the finding of natural gas in the Eastern oil districts, efforts are being made here in the same direction. Indications of gas have been found in wells in Contra Costa, San Mateo, Lake, Marin, Sutter, Santa Clara and Sonoma counties, and also in some of the Southern counties. As yet no abundant and free flow of gas has been found, though at several places jets are burning. The conditions are not so well known here as in the East, but it is very probable that at one or more of the wells now being bored a good strong flow of gas will be secured.

It is stated that measures are being taken to prevent the Malakoff mine from working by the elevator process.

## A Vanishing Race.

As the years go by and the field of their labors contracts, that class of men known on the Pacific Coast as prospectors grows less and less. Of the original stock a large proportion, worn out with hardships and toil, have already gone to join the silent majority, their ranks having meantime been but little recruited because the unexplored mineral regions have undergone such steady contraction. We speak now of the professional prospector and not of the pioneer miners as a whole. Of the latter

there are still a great many left, but of that restless, hardy race, who, crossing the mining frontier, were the first to push out into the little-known, unpeopled regions beyond in search of mineral wealth, the number remaining is now comparatively small, and it will not be long until this class of men will be as much an extinct species as the dodo. Having done their work and outlived the conditions that gave rise to their existence, they will disappear as other hardy men have disappeared before the march of Western civilization and progress.

Daniel Boone, the typical backwoodsman, was the product of circumstances, his class multiplying and spreading as the tide of emigration surged toward the land of the setting sun. As conditions changed so did the character of these frontier-men change to suit them. The trapper, the mountaineer, the Santa Fe trader, the cowboy and the prospector have appeared successively on the scene, each in turn having been evolved from the ever-changing conditions that obtained in the Great West. When the surroundings shall have so altered that there will be

no longer a call or even a place for this class of men, they will, like the buffalo and the Indian, wholly disappear, some of them having already passed away.

But for their names attached to some river, lake or other natural object, there would be little to remind us that the hunters, trappers and other servants of the great fur companies had ever traversed the interior of the continent, there being, except the names of some stockaded posts, just as little on the vast plains of the Central West to attest the presence there of the mountaineer and the Indian trader. As have these other pioneers of the wilderness vanished, so after a little will the prospector vanish from the earth, leaving hardly any record or memento of his existence save the names borne by the bars, gulches and diggings he was the first to discover.

THE Alpha mine at Rye Patch, Nevada, has been sold to a Reno company for \$20,000.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—Eds.

## The Buchanan Mine.

EDITORS PRESS:—In looking over your useful paper of March 3d, I see quite a number of mines mentioned in Tuolumne county. However, the largest and most extensive mine in the county and the largest hullion-producer was not mentioned. I will therefore give you a little information in regard to the Buchanan property, which is situated 14 miles east of Sonora and is reached by one of the best mountain roads in the State. The elevation of the Buchanan is 3200 feet. The Buchanan mine forms a small village of itself. There is any quantity of timber.

The Buchanan Co. last summer put in 3000 cords of wood at the mill and mine, and the present summer the company intends putting up electric works to run the mill and mine. Water is supplied the mill by a flume five miles in length, which conveys the water from Hunter canyon to the Buchanan mill. This mill is one of the most complete 20-stamp mills on the coast. The mill has run steadily night and day since it was constructed, which was one year ago last July. It is supplied with ore from the mine by automatic cars, the mill being a distance of 500 feet from the mine.

The mill is supplied with all the late improved gold-saving appliances. There are eight Froe concentrators. There are 300 tons of sulphurets stored, which will work \$200 per ton, a little bonanza of itself. The company contemplates putting up chlorination works as soon as they can make satisfactory arrangements for the plant. The mine has hoisting works, charge-room, blacksmith shop, store-room, two large steam boilers 18x54, two large duplex air compressors 12x20, of the Rix patent, which are used for pumping water out of the mine in connection with two underground pumps. There is one Worthington duplex pump at the fifth level, which pumps the water to the second level, and one Garrett pump at the second level, which pumps the water to the surface. There are also two National drilling machines in use which are run by compressed air. The present depth of the mine is 660 feet, and they are still sinking. The fifth level is reached by a two-compartment shaft (inclined) and at each 100 feet is a station, with drifts running each way on the ledge. The ore body is from 8 feet to 40 feet wide, and carries free-milling gold ore.

East of the 500-foot station there is a pair of hoisting engines used in sinking the incline, which is at present 160 feet below the fifth level and in a large body of high-grade ore. This was satisfactorily shown by the last cleanup, which resulted in the largest bullion shipment that the mill ever turned out in 28 days. It is the intention of the company to sink the incline down to 1000 feet, out a station each 100 feet and drift each way. At present the company is only taking out ore in places where work is necessary to be done to open up the mine. There is at present ore enough in eight to keep a 40-stamp mill running for years. The company contemplates adding 20 more stamps to the present mill of 20 stamps.

There are 60 men on the payrolls, and in a couple of weeks they will also have about 30 men at work in the woods getting out wood, timber and lagging.

The company has a large hoarding-house and a number of dwelling-houses which are occupied by employees. They pay good wages and make everything as comfortable and as agreeable as possible for the men employed at the mine.

In connection with the premises is a large store where the men are supplied with all necessities. A stage runs to Sonora twice a week in winter and three times a week in the summer-time carrying U. S. mail and passengers.

About one mile north from the Buchanan mine is the Gold Hunter's mill and mine which is in operation. The mill and hoisting works are run by a 45-foot diameter overshot water-wheel. The mill has 10 stamps.

The mine is mostly worked by tunnels at present, but in a short time they contemplate sinking the Hunter shaft to a greater depth. So much for the Buchanan and Hunter property, which are owned by two gentlemen of San Francisco.

J. S. H.

Buchanan Mine, Sonora, Tuolumne Co.

## The Soderling Amalgamating Pan.

EDITORS PRESS:—The description you gave of my amalgamating pan in the PRESS of March 10th was generally correct, but there is one thing to which I wish particularly to call attention in connection with it. With an additional cost of one-fourth in fuel, my pan will do in 2½ hours' time the same amount of work that can be done by any other pan in 5 hours' time, and, further, give an increase in yield of 30 per cent of contents in precious metals in tailings treated. Therefore in erecting mills I claim for my pan the following advantages:

That by the use of the slotted ring or supplementary muller a pan can be built that will work a charge of 10 tons and will extract a higher percentage in less (or two-thirds the time) than can be done by any pan now in use. This with, say only four pans of five tons capacity each, running three hours to a charge,

would work 150 tons per day, which, from above-stated facts, would be a great benefit and saving in cost of erecting a plant. It would also require less machinery with gears and long shafting, smaller buildings, and could be run at a very little more than one-half the expense required to run any other style of mill with equal capacity.

Bodie, Mono Co.

## Soulsbyville Mines.

EDITORS PRESS:—Our town has been quite dull for several years past, but the mines look very favorable and will make times lively this summer, and will give employment to a large number of men.

The Black Oak Mining and Milling Company has decided to put up new works at their mine and mill, to be run by water-power. The ditch to the Platt and Gilson mines is being enlarged to carry sufficient water to supply them. About 500-feet fall can be had by taking the water from this ditch. They have been running the mine and mill altogether by steam, and I suppose they have found out that wood is most too expensive when water-power can be had for less than one-half what it costs to run by steam. The mine is looking splendidly. One of the managers informs me that they have another chute of high-grade ore. The average width of the vein is six feet. This is a valuable mine, and the owners deserve success, as they have spent several thousands in opening the property.

There are now 15 men employed at the North Star mine. They are taking out some good-looking ore from the two bottom drifts, and the vein is several feet wide. The mill was started last week. This company has also commenced work on the Luavia mine east of the North Star. They have rented an engine and it is now on the ground and will be put in place in a few days. They are using steam at both mill and hoist, but after the mines are thoroughly opened and proved good they will most likely get water-power. Over 500-feet pressure can be had by taking the water from the Soulsbyville branch ditch.

J. L. Coles, now of New York City, who spent considerable money in the Soulsby and Bowden mine three or four years ago, has with his brother, D. H. Coles, invented three machines and patented them. If they make a success of them he will return to this county and reopen the mine. The ore taken out of this mine yielded \$70 and over per ton. The sulphurets are also very good. It is supposed by many that this mine is the north extension of the Soulsby.

In stripping down and cleaning out the old shaft at the Platt mine last week, a fine chute of ore was opened. It is said to be very rich. By standing 10 feet away, gold can be seen in the vein. They have put the pipe in place and the hoisting works will soon be completed. They will then commence sinking the shaft.

I was shown some very fine ore this week by B. F. Lowe, which was taken out of the Woodpecker mine, he being one of the parties who has it bonded. He says the vein is small and water is a great drawback to them.

Surveyors have been surveying a ditch from the Rising Sun ditch to the Dead Horse mine at Summersville. It is expected that they will have water to the mine before many months.

The Soulsby mine was started this week. They are putting through the mill some very good ore and we hope they have an abundance of it.

Soulsbyville, Cal.

## Squaw Creek Mines.

EDITORS PRESS:—Owing to the storm of March 4th, I could not examine the Squaw Creek mines as thoroughly as desired, there being considerable snow upon the mountains and in the vicinity of the trails and roads. There has been considerable capital invested in the above mines, and I venture to say that it has been rightly made, as I believe the mines are better than represented. The ledges are large and contain uniform pay throughout. The fissure veins of this camp are known to gain in size and richness as depth is increased. The ledges do not make a big blowout on top and then pinch out, as many ledges do. I do not mean pinch out altogether, as this seldom occurs in any mining camp, although it is often said that they do. This is, however, a mistake, for men's money and energy always tire out first. During the last year or two there has been considerable confusion and some failures in and about our mines. I will venture to say, however, that this is mainly on the part of incapable management. The most of the mines now idle have paid well when properly managed, and when we get practical men to take hold of our mines and mills, then old Shasta county will come to the front.

Lower Springs, Shasta Co.

The vein in the Treadwell mine on Douglas island, Alaska, is credited with a breadth of 450 feet, the ore of which assays from \$6 to \$8 a ton. The 200 stamp mill will soon be in readiness to crush 600 tons daily. The cost of mining and milling does not exceed \$1.25 per ton, which will leave a daily net profit of \$2800 to the owners.

## Matting Dry Auriferous Silver Ores.

(Concluded from our last.)

## Discussion.

Dr. Thomas Eggleston, New York City: I have listened to Mr. Austin's paper with the greatest interest. The problem of concentrating the precious metals of poor ores which contain neither copper nor lead is a new one in this country, and has not, to my knowledge, been attempted before on any very large scale, either because of the price of fuel, or because the distinctly American methods of treating ores offered, for the time being, an easier solution. But when there is neither copper nor lead to be used as a conveyor of the gold and silver, the question is a pressing one, and Mr. Austin has suggested an answer of it which, from the careful method of investigation which he has presented to us, I have little doubt will be satisfactory. The problem how to concentrate silver and gold in an iron matte seems at first sight a very simple one. Assuming that there is no other metal to carry off the gold and silver from the iron matte into a metallic regulus below, the problem seems to be to produce an iron sulphide which will contain all the gold and silver, and a siliceous slag so fluid that all the grains of matte will settle out of it, and thus to get rid of all the gangue in a single operation and without producing any chemical change, and thus to concentrate the precious metals. To do this, however, is not so simple. In copper and lead there are either the affinities of the metal or chemical reactions which can be depended upon to produce the concentration; but, although the largest part of the silver and gold found in the world is in some way either combined or associated with sulphur, we do not yet know of any reactions tending to concentration in an iron matte, other than the action of gravity. If it can be ascertained that a compound can be made of gold, silver and iron with some substance, which will be heavier than a compound of sulphur and iron, so that liqation can be effected in the iron matte, producing an alloy which will be so much more dense than the matte that the gold and silver will separate, forming what the English, using the reverberatory furnace, call "bottoms," the problem would be solved; but we do not know as yet of any such alloy. Mr. Austin seems to have solved the problem of simple smelting, and, if there is any such thing as the production of iron bottoms in a shaft furnace, will probably find the method of producing them. Concentration by fusion, which he suggests, is also possible, but it will probably be cheaper to send the first matte to market than to concentrate it by fusion. The use of the *spur of*, while it seems to have the advantage of avoiding engorgements in the furnace, is really only the

## Production of a Matte by Liqation.

It would have been very interesting if Mr. Austin could have given the details of the experiments which led him to the adoption of this furnace, and the abandonment of the *sump-ofen*, which seems the natural furnace for this process, and what attempts were made to overcome the difficulty of too high a heat for the iron sulphide and too little for the slag. In this case there was no necessity of concentration, but if it could have been done, the richer product would have been more marketable, while the poorer products could have easily been re-treated.

Mr. Austin has not touched another subject which would have been of the highest interest to us all, and that is, what the relation of loss by volatilization is in this process to that of the other processes. I have had occasion to point out that, in the ordinary lead smelting, silver might be carried more than a mile without condensation when melted in the presence of considerable quantities of lead containing both arsenic and antimony. The complete absence of these last two metals, and the small amount of lead, will probably make these losses much less, and it would have been very interesting if we could have known what they were. Losses, due to improper chemical constitution or pasty condition of slag, have been long studied, but there is too much taken for granted. Slag as says rarely show the total loss, and I have very little doubt that the search for the difference would throw much light on the proper method of conducting the process. It is to be hoped that these experiments will be continued, and that others will try the same method with the same energy and ability which Mr. Austin has shown.

E. G. Spilehny, New York City (communication to the secretary): Mr. Austin's paper is certainly one of intense interest to all of us who are, in any way, wrestling with the difficult problem of

## Beneficiating Low-Grade Auriferous Pyritic Ores.

Too little attention has, I think, been heretofore paid to the possibilities of economical treatment of such ores, by processes such as that described and practiced by Mr. Austin.

We must not lose sight of the fact, however, that the introduction of this system of matting, or what may be termed "igneous concentration," so far as it is at present developed, would be only economically possible in certain districts and on certain ores. Its success depends fully as much, if not more, than that of water or air concentration on the difference of the specific gravities of the materials treated. We all know that, generally, the gold in sul-

phides is in an infinitesimally fine condition, and, therefore, in order to permit its particles to sink in a molten mass by their superior gravity, it will be not only necessary to have an excessively fluid slag, but some agent must be present which will amalgamate with, and so agglomerate, the gold particles as to permit them to sink by virtue of their superior gravity through the molten slag. In other words, no separation of the metallic particles from the slag is possible, unless these particles are of such a size that the difference of their specific gravity from that of the surrounding fluid is enough to overcome the friction of the fluid on the surface of the particles, which tends to hold them in suspension. Iron alone does not appear to amalgamate readily with gold. It, therefore, seems to me that the process necessarily requires the presence of either silver, copper or lead to make it thoroughly successful. Mr. Austin, as I understand it, himself admits this, and thus corroborates the results obtained by myself in experimenting on plain auriferous pyrites.

To be able to run successfully in a blast-furnace, it would also be necessary that at least a large proportion of the ore should be in lumps—a condition which would probably preclude the economical application of Mr. Austin's process to the treatment of fine auriferous iron sulphides, resulting exclusively from stamp-mills or concentration works.

Still, notwithstanding the possibly only local application of the system to certain districts, the fact remains that Mr. Austin is entitled to the credit of having initiated and perfected what is really in this country a new metallurgical process, that of matting auriferous silver-bearing iron sulphides, and so has made possible the treatment by fire-concentration of certain deposits in Montana of low-grade gold and silver ores which could not heretofore be utilized with any profit.

C. Kirchhoff, Jr., New York City (communication to the secretary): Mr. Austin's practice at Toston is valuable, as showing that under special circumstances matting pyritic silver and gold ores may prove the most economical. In the absence of a comparative statement of the costs from ore to marketable product with the method adopted and with lead-smelting, purchasing ores, it is difficult to draw any inferences how widely, territorially, matte-smelting is applicable. One point indicates that circumstances were locally more in its favor than is likely to be the case in any but isolated instances. It will be noted that the freight charge is only \$1.50. On the other hand, Mr. Austin, in the case of base bullion, throws the entire treatment and freight charges on the precious metals, when naturally the lead bears a part of the burden. This method of computation is fair only when it can be proved, as, indeed, happens in some cases that the price paid for the lead in the ore is equal to or even greater than can be realized for it as bullion.

Mr. Austin (communication to the secretary): The inference drawn by Mr. Spilsbury that the

## Success of this Process

Depends wholly upon the difference in specific weights of the various bodies involved is, in the main, correct; yet only so far as the same words might apply to any other smelting process.

That the gold contained in iron pyrites is in the metallic state, divided up in infinitesimal particles, and is collected out of a viscous, highly siliceous slag by alloying itself with the one or two per cent of silver, copper or lead contained in the matte, is improvable. The minute particles of gold could not separate in the metallic state out of a thick oily slag in the short period allowed them for such a purpose; and as the other metals mentioned above go into the matte in combination with sulphur, in the form of sulpho-salts, there remains no metallic body with which the gold could alloy itself. Hence it seems possible that it also enters the matte chemically combined.

Gold builds sulphur salts with the alkalis in the same way as does silver. Silver goes a step farther, and combining with sulphur and iron, gives us the mineral Sternbergite ( $\text{Ag}_2\text{S} + 2\text{FeS}$ ). May there not also be a combination of sulphide of gold and sulphide of iron, or some other metallic sulphide? Unless some such explanation is admissible, it is difficult to understand why the collection of the gold in the matte should be comparatively more perfect than that of the silver.

Bloxam ("Chemistry," edition 1867, p. 403) writes: "In smelting the ores of gold in Hungary, the metal is concentrated by means of sulphide of iron. The ore consists of quartz and iron pyrites (bisulphide of iron) containing a little gold. On fusing the crushed ore with lime, to flux the quartz, the pyrites loses half its sulphur, and becomes sulphide of iron ( $\text{FeS}$ ), which fuses and sinks below the slag, carrying with it the whole of the gold."

This idea of fusing the raw sulphurets with lime has, in two instances at least, been tried on this continent with results highly encouraging to further experiment.

In this connection one is reminded of the fact that the condition of the gold in iron pyrites has never been satisfactorily demonstrated.

As regards the smelting of fine pyrites, concentrates for instance, in a blast furnace, this can be done by running the charge very low, as is common practice with copper smelters in the West, when a strong reducing action is not necessary. The blast in such a case passes up through the charge freely, keeping the whole



mass in a condition—for want of a better simile, I will say—like that of boiling water in a pot. Of course, dust chambers are a necessity when this is done.

Or, the reverberatory furnace might be used for treating such line material. At Freiberg, when matting was extensively carried on, the reverberatory was used in preference to the blast furnace.

#### The Adaptability of this Process.

Assisted by modern improvements in furnaces and associated appliances, is capable of extension; and the available market for iron matte is of itself an inducement to investigate the matter further. Recently a treatment charge was made us of \$2 per ton on iron matte, with the possibility of even that small tax being stricken out. This amounts to practically paying for the iron contents!

Investigations on several details which readily suggest themselves, connected with the subject under discussion, are being followed up, but on account of their incompleteness have not been touched upon in this paper. The results of this work, if successful (and there is much encouragement), I hope at some future date to lay before the members of the Institute.

In reply to Mr. Kirchhoff's comments, I would say that the costs of producing matte or bullion are about equal; furnaces of the same capacity are used, requiring approximately the same amounts of fuel and labor. The freight charges of \$1.50 per ton referred to must be taken in connection with a treatment charge of \$15, making a total of \$16.50. Another bid for this product was freight \$11.95 per ton and treatment \$2; total, \$13.95, which goes to prove that the matter of freight does not seriously influence the results given. As previously stated, lead ores are at a premium in Montana.

F. W. Clark, Boston, Mass. (communication to the secretary): I think Mr. Austin has opened up

#### A Very Promising Field.

And has practically demonstrated that under certain conditions gold and silver can be economically concentrated in an iron matte, making it possible to treat a certain class of ores not desired by the millman or lead smelter. Our experiments on the Haile mine pyrite, sent to us by E. G. Spilbury, were not at all successful, as will be seen by referring to his paper. They confirmed smaller tests previously made by him. The material operated upon was raw and roasted auriferous pyrite, containing 10 to 35 per cent of silica, melted without flux in a small reverberatory furnace (hearth 3½ feet by 3½ feet) and tapped into molds. All our slag carried gold, from 0.5 oz. to 1.64 oz. per ton, and the matte contained from 1.2 to 8.5 oz. per ton. The slag carried no visible matte, except where it lay on the matte-cake. The slag probably contained matte in a dissolved state, like sugar in water; and the gold in the slag was, I believe, in a combined state, since repeated assays of clean slag would yield the same result. Mr. Austin's results confirm the opinion I formed at that time, that, for successful working, some other metallic sulphide than iron must be present in the matte, and that the slag must contain some other base than iron. I suggested at the conclusion of our experiments that we brick the ore with lime and smelt in the blast furnace, making a slag containing 12 to 15 per cent CaO, and expected much better results by this treatment; but owing to the total absence of limestone in the vicinity of the Haile mine, which would render the shaft-furnace and lime slag impracticable in practice, this experiment was not tried. As Mr. Austin remarks, laboratory experiments are not conclusive, and I have no doubt that far better results would be obtained on a large scale with properly constructed furnaces, longer time, addition of a little lime, thorough riddling, etc. But that slag sufficiently low in gold to be thrown away can be obtained, I doubt. Mr. Austin's matte undoubtedly contained lead, if metallic lead was reduced. The fact that

#### Gold-Bearing Sulphurets

Are neonally in a fine state does not appear to be a serious objection, as a partial roasting is in any case necessary to obtain the iron oxide to flux the siliceous ore. After roasting, a certain amount of sulphate of iron is present, and if a little lime (five per cent or less) is added, and the mixture air-dried, it will be sufficiently coherent to stand a moderate amount of handling, and will work well in a low blast-furnace without giving an excessive amount of flue-dust.

If both siliceous ore and pyrite be fine, why not mix them, partially roast and slag, and then smelt in the blast furnace? If the *spur* of type of furnace is used, and the slags are kept below 40 to 42 per cent SiO<sub>2</sub>, the smelting should not be difficult.

It has been suggested, since the experiments were made on the Haile concentrates, that, if after the charge in the reverberatory was thoroughly melted, a little raw iron or copper sulphide had been sprinkled on the charge, and the heat had been raised, it might have carried with it the gold in the slag.

THERE is a probability that the Panoche coal mines will be developed at once. The coal is pronounced equal to Wellington, but is 18 miles from the railroad, in Fresno county.

JOEL F. LIGHTNER has again been appointed secretary of the Hale and Norcross mine. This is the 28th year he has served in that capacity.

## Metallurgy of Zinc.

### Calamine.

Some mineralogists object to the use of the term "calamine" when applied to the carbonate of zinc, but on putting the question to Melville Attwood of this city, he at once said it was the common English name for the pure carbonate of zinc, and furnished us with the following authorities, and also some interesting particulars respecting the metallurgy of zinc:

1st. "Alger's Phillips' Mineralogy," Boston, 1844, page 567: "Calamine," carbonate of zinc, from the Latin *calamus*, a reed. It is found in Tarnowitz, in Silesia, Aix-la-Chapelle, Matlock in Derbyshire, Alston Moor in Cumberland.

2d. "Handbook of Geological Terms and Geology," by David Page, F. G. S., 1859, London, page 101: Calamine, the common name for the carbonate of zinc.

31. "A Dictionary of Chemistry," by Henry Watts, Vol. I, page 713: "Calamine," native carbonate of zinc.

4th. "A Practical Treatise on Metallurgy," by Crookes and Rohrig. Lead, silver and zinc. London, 1868, page 403: "Calamine." This general name is given to the combination of the oxide of zinc with carbonic acid, page 434: The Belgian process—treatment of calamine at Morenet Vieille Montagne near Aix-la-Chapelle. The calamine occurring in this neighborhood is partly calcined in large kilns and partly in reverberatory furnaces, after having been ground by edge-mills and combined so as to contain 50 per cent of zinc.

5th. "Dr. Ure's Dictionary of Arts, Manufactures, etc.," page 165: Brase, an alloy of copper and zinc. It was formerly manufactured by cementing granulated copper with calcined calamine—native carbonate of zinc.

6th. "Elementary Course of Geology," Olmsted, London, 1850, page 212: "Calamine," carbonate of zinc. This is the usual ore of zinc, and the metal is obtained from it by distillation. Electric calamine was long confounded with calamine; it is, however, a true silicate of zinc.

7th. "Manual of Metallurgy or Practical Treatise on the Chemistry of Metals," by John A. Phillips, London, 1859, pages 413 and 414: "Calamine," carbonate of zinc—zinc carbonate—the silicate of zinc electric calamine. This mineral was for a long time confounded with carbonate of zinc, although they differ materially from each other both in their chemical and physical properties.

8th. "Manual of Metallurgy," G. H. Makins, London, 1862, page 398: "Native carbonate of zinc or calamine is an abundant ore, not only in our own country, but also in Belgium, Silesia and the United States. It contains 60 per cent of oxide of zinc and 35 carbonic acid."

9th. "The Playbook of Metals," by John Henry Pepper, London, 1862, page 496: "Carbonate of zinc. Calamine, oxide of zinc and carbonic acid and water."

10th. "Elements of Mineralogy," by Richard Kirwan of the academies of Stockholm, Upsal, Berlin, etc., London, 1796, Vol. II, page 232: "Zinc—calamine, galena of Werner—mineralized by oxygen, with or without forced air. Of this species we may distinguish three families—the loose or pliable, the compact and the etriated. It is frequent in China, and there called wohan, or ore of Tatenago."

11th. "A Treatise on a Section of the Strata from Newcastle-upon-Tyne to the Mountain of Cross Fell in Cumberland," 1821, London, page 260: "Langley Zinc Works, using calamine, black jack, etc."

12th. "The Useful Metals and Their Alloys," by John Scofield, William Tennant, William Clay, Robert Oxland (mineral chemist, Plymouth), William Fairbairn, F. R. S., W. C. Aitkin and William Vose Pickett, London, 1857, page 152: "Zinc. This metal was first obtained in a metallic state early in the sixteenth century, but for a long period subsequent to its discovery the production of metallic zinc as one of the useful metals remained in abeyance. Calamine, a carbonate of the metal, was employed in the crude state for alloying with copper in the production of brass."

13th. "Percy's Metallurgy," by John Percy, M. D., London, 1861, page 612: "Preparation of Brase. Until a comparatively recent period all brass was made by the old process of 'cementation,' which has been almost entirely superseded by that of alloying zinc in the metallic state directly with copper. Manufacture of calamine brase. Only a few years ago I saw the old process carried on in Birmingham at M. Pemberton's works. Calamine brase works were established in Bristol about 1702, and afterward at Cheddle, Staffordshire, about 1720." Page 549: "Hydrated silicate of zinc or electric calamine. In some mineralogical works this mineral is described under the same name as common calamine or carbonate of zinc, and confusion is apt to arise in consequence. Thence the name Smithsonite is applied to it in Brooks and Miller's edition of Phillips' Mineralogy, while in Dumas's Treatise the same is applied to carbonate of zinc."

14th. "Chemistry," by William Brande, D. C. L., F. R. S., of Her Majesty's mint, etc., 1863, and Alfred Swaine Taylor, M. D., F. R. S., page 378. "Native Carbonate of Zinc or Calamine." It abounds in Somersetshire, Flintshire and Derbyshire. The variety

known by the name of electric calamine, from its property of becoming electrical when gently heated, consists of oxide of zinc in combination with silica.

15th. "The Principles of Chemistry," by Dr. Julius Adolph Stockhardt, translated by C. H. Pierce, M. D., 1852, page 280: "Carbonate of zinc occurs also in nature most abundantly in Silesia, Westphalia, and Belgium. It is the most important zinc ore, and metallic zinc is generally prepared from it in the above mentioned places. The miners call this ore calamine."

16th. "Elements of Chemistry," by J. L. Comstock, M. D., New York, 1854, page 301: "Calamine zinc never occurs in the native or pure state, but is always found combined either with sulphur, carbonic acid or oxygen. The sulphuret of this metal called zinc blende and the carbonate called calamine are the ores from which zinc is obtained."

17th. "Manual of Chemistry," Geo. Fownes, London, 1854, page 286: "The native carbonate or 'calamine' is the most valuable of the zinc ores."

18th. "J. J. Barzillieu on the Use of the Blowpipe," 1855, page 195: "Carbonate of zinc, 'calamine,'"

19th. "Plattner on the Use of the Blowpipe," edited by Dr. Sheridan Muspratt, page 151: "Zinc is found in nature as a carbonate in calamine."

### The Miners' Side.

#### They Petition Congress in Behalf of the Biggs Bill.

A petition, of which the following is a copy, is being circulated for signatures and is being generally subscribed to in the mining counties of the State:

The undersigned, miners and residents in the gold-mining belt of California, respectfully ask for and urge the passage of the bill introduced in the House of Representatives by the Hon. Merion Biggs, and having for its object the survey by Government engineers of the rivers and streams of the State affected by mining debris. And we would further memorialize Congress in relation to the question involved.

Forty years have now gone by since the new reached the Atlantic Coast of the discovery of gold in California. That discovery excited the world, and led to the rapid settlement of the Pacific shore. Mining was the paramount industry of California for years, and was so declared by one of her early Legislatures. In hundreds of cases the rights of miners had been defined by the courts and settled. Congress had recognized the mining laws made by districts and the State Legislature, and has partitioned mining lands and sold them at high rates, knowing that they were to be washed away and the debris deposited in the streams. An amount of gold had been taken from the western slope of the Sierra Nevada equal to the national debt, enriching the whole nation. Without the vast production of California gold, the nation could not have maintained its credit and survived the War of the Rebellion. The costly lakes and canals we had constructed for mining purposes, the labor we had expended and privations we had endured for years, the investment of the fruits of our toil, the knowledge of the benefits of our mining to the world, as well as the recognized rights conceded to us by almost every civil authority, had led us to believe our rights as miners were indefeasible. In the confident expectation of realizing a competence at last from our long toil and investments, we had made our homes by the mines, and children were born and reared to a knowledge of mining alone as an industry.

In an evil hour for us came decisions from the courts of the United States—decisions based on riparian law to which from the whole time of the American occupation of the mining region of the country we had been total strangers, and had supposed our own experience of a third of a century was a better basis for mining law than the experience of our British ancestors of a thousand years could possibly be, applied to a country so entirely different from that in which they lived. The scope of those decisions dooms all mining of whatever nature. The geological character of the mining region, the location of the mines, and the modes of extracting gold from the soil or rock, necessarily require the deposit of the mining debris at the lowest points. The loosening of soil on slopes by the plowman, as well as the pulverization of soil or rock by the miner, invites the heavy rainfalls of our winters to hear the materials loosened and disintegrated to the valleys. It is the inevitable law of nature. But the courts have issued injunctions against discharging any material from the mines into the streams on the assumption that the navigability of navigable water is sacred, and must not be impaired. They have gone further. When the miners at great expense have built restraining dams to hold their debris, the courts have assumed to know more than skilled engineers of the strength and efficiency of these dams, and have prevented their use, punishing with fines and threatened imprisonment to the builders. More than this, the courts declare that it is not their business to take cognizance of the damage their decisions inflict upon miners, but that it is their duty to give relief to the complainant however little be his injury, even if that injury be not real but assumed to be prospective. And thus property to the value of hundreds of millions of dollars has been destroyed by the fiat of the courts, and thousands of men have been thrown

out of employment, despoiled of their all and reduced to poverty. The gravel gold mining region of California which has enriched the world with its wealth, and which is comparatively yet untouched, is a scene of ruin and desolation. The plea is diligently uttered that no designs are entertained against mining by the drift and quartz crushing processes. But it is the siren song to lull some into fancied security while the conquering goes on in detail. The courts hold out no such hopes to any mode of mining. Their blows are leveled at any process that dumps debris into streams. Drift miners have been enjoined, and every miner is at the mercy of any blackmailer, or any one mean enough to make a complaint. Miners working on a small scale have been stopped in Plumas county, more than 100 miles away from the field of alleged damage, and that damage only prospective.

Your petitioners would further respectfully represent that the mountain streams flowing from the Sierras to the great California valley contain the accumulated debris of the mining of years, which eminent engineers and the courts declare threatens to overwhelm the people and property at the debouchure of these streams with an avalanche of sludges. The survey contemplated in the bill of Mr. Biggs is with the view to determine what can be done to ward away the damage to the inhabitants of the plains and to their property. Taking an intelligent view of the situation, the Legislature of the State last year by a vote unanimously favored the action contemplated by the bill in question. Thirty of the most eminent engineers the Pacific Coast has known, among them Col. Mendell and Capt. Eids, have testified to the needs of restraining dams, and that they can be constructed to stop the flow of the debris already in the streams and allow mining to continue. We, your petitioners, ask that a thorough survey of the debris laden rivers be made as a measure looking to the safety of life and property in the valleys which we would not have a scene of distress and desolation like that around our own mountain homes. We ask it in the hope that when the work is done it will be found that mining can continue, with wise precautions, with safety to all, and with the firm belief that such survey will show a just government the despotism of the courts toward us, and will hasten to relieve us from their domination by placing mining under the protection and direction of positive statutory law. It may be that some very valuable mines will have to remain closed, but we know that there are hundreds of mines of untold value, which with proper safeguards will yield millions of money, but are now the prey of the spy, the blackmailer and the interpreter of riparian law of a barbarous age. Your petitioners would invite the attention of Congress to the logic of the decisions of the courts touching the "sacredness of the navigable waters." In effect it relegate the country to barrenness and uninhabitability, for the day is fast approaching when the soil will no longer produce the cereals with profit, and large areas can only yield other productions with irrigation. The diversion of water for irrigation decreases its depth in navigable streams and injures their navigation. The waters of our rivers properly utilized will enable California to support a population of thirty million people. Can the navigability of navigable waters be more sacred than the lives of millions? It may thus be seen that the decision of the courts sit like incubi upon the future agricultural growth of the State, as they now do upon mining. They invite the serious attention of statesmen, and to statesmen we make this earnest appeal.

**A SALT TRADEMARK.**—The American Salt Company has commenced suit in the Superior Court against the firm of Alfred McGrothy & Co. to recover \$25,000 damages for an infringement of trademark. The plaintiffs stated that on May 18, 1882, they purchased from S. O. Putnam, Patricio Marciano and C. B. Tilley, the right to manufacture a certain brand of Carmen Island salt. They have secured a legal trademark bearing the words, "Premium American Salt Company, warranted pure extra refined Carmen Island Dairy and Table Salt," which, it is alleged, the defendants are using on imitation or counterfeit of. The plaintiffs pray that an injunction be granted, that the defendants be compelled to account for their sales of salt with this trademark on it, and for \$25,000 damages.

**INCREASE IN THE SOUTHERN PACIFIC RECEIPTS.**—Colonel Crocker stated to a reporter that the gross receipts of the Southern Pacific system from January 1st to March 10th showed an increase of 47 per cent in comparison with those of the same period of 1887. The February receipts were considerably larger than those for January, while the March receipts will, in all probability, be larger still. The increase, Colonel Crocker stated, is a phenomenal one and is very gratifying to the directors. The operating expense this year, however, are going to be very heavy, as immense sums will be spent in providing new equipments and in repairing the road-bed.

**THE CARSON MINT.**—The President has sent to the Senate the nomination of John H. Dennis to be melter and refiner of the mint at Carson, Nev. Mr. Dennis has been deputy United States revenue collector for the district of Utah since June, 1886. He was in the California Legislature in 1861 and 1862, and has been repeatedly elected State senator in Nevada.





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SAN FRANCISCO

Saturday Morning, March 31, 1888

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#### Business Announcements.

[NEW THIS ISSUE.]

Water Wheels—The Pelton Water Wheel Co.  
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See Advertising Columns.

#### Passing Events.

The River and Harbor bill reported favorably in Congress gives this coast larger appropriations than ever before. California, Oregon and Washington all fare very well. Among other things there is an innovation in providing for permanent moorings on the northern coast, where the harbor facilities are poor.

The mining community of Nevada county is in quite an excited state over the recent outrages committed there. Incendiarism and the use of dynamite never helped any cause, nor will it effect any solution of the question of miners' wages. The individuals who have committed the outrages would be roughly treated if caught.

The Comstock lode is gradually increasing its daily hulsion product, and before long it is expected that there will be several dividend-paying mines.

Castle district, Meagher county, Montana, is coming to the front as the most promising of the new mining camps in the Rocky mountains. Among other things they have the finest flux yet discovered in the country, supplying the deficiency of the great smelting industry of the Territory.

In this State the prospects for quartz mining were never better. It is thought that this season a number of old mines will be reopened. They can now work gold ores in California cheaper than anywhere else in the world.

#### Mineral and Agricultural Lands.

Several references have been made in the PRESS of late to the fact that considerable mineral land had been taken up as agricultural, owing to the faulty manner in which the laws are carried out. The people in Montana are now engaged in bringing the subject to the attention of Congress, in connection with the railroad land grants, where large tracts of mineral land are being patented, though the grante especially except that class of land. In this State, and elsewhere on the coast, more or less mineral land is now covered by agricultural patents. As when the patent is issued, whatever mineral there may be is covered by it, the area for prospecting is gradually very diminished.

We see now that a test case is to be brought before the courts in this State, to decide whether land that has been entered as agricultural and patented as such, when found to be mineral can be held by the patentee. A Tuolumne county mining syndicate has located nearly the entirety of Wolfing's hill for mining purposes. This land, as we understand from the *Sonora Democrat*, has already been entered and patented as agricultural.

While it is doubtful whether the land so patented can be taken away from the locator and restored to the public domain unless fraud can be shown, it will be a good thing to have the subject tested. There are hundreds of similar cases all over the coast. It will be difficult to invalidate the agricultural patent. Nevertheless, the lax method by which land containing minerals is entered as agricultural should be remedied; and the fact that the miners are awakening to a sense of their rights is a good sign. There are many regions known to be mineral-bearing to mining people, but agricultural people would not know them as such, and, as in getting the patents the testimony required is only negative, the agriculturists can very well testify that they know of no minerals. Unless some miners are interested in the special locality they will not take the trouble to volunteer testimony. The patent issues, and when mineral is found it belongs to the man who took up the land as agricultural.

#### Stock-Board Mining.

It is rather a good sign when people up on the Comstock lode conclude that it is not any business of the San Francisco brokers how the mines are managed. Time was when the lode was pretty much "run" by the stock board. A committee was recently appointed by the San Francisco Stock Exchange to investigate Comstock mining management, but the people up there do not see that it is any business of theirs anyhow. The brokers generally do not own any portions of the mines, and though it would be a good thing to give people who buy stocks some assurance that everything is fair and above-board, it is difficult to see how the brokers can do much.

The truth is, the mines are being worked more for ore in these days than for stock-board purposes. There has been no stock excitement here for many a day. People are shy of buying, as they have been taken in so many times. The mines on the lode are now producing \$600,000 or \$700,000, with prospects of an increase, and they can afford to feel independent of stock-board influences.

Experience long since proved that mines could be worked very well without any of the machinery of stock exchanges. There are very few California mines listed on our boards, and those that are do not comprise our best ones. The lists now mainly comprise Nevada properties, and these are gradually getting out of the influence of the stock sharps in the exchanges. The stock exchanges here do very little business as compared with former days, and where they have been formed in other cities they have eventually proved failures.

There never was any guarantee by the Board of Brokers that the mines listed were legitimate mining ventures. A stated fee was required, and this paid, no questions were asked. As a result, a lot of "wildcats" were palmed off on the public by the promoters. So many tricks were played on buyers that the buyers finally got disgusted and quit the business. There are still a few left, of course, but the number grows less month by month. The

brokers have hard work to make a living in these days. But the mines are in better shape than they have been for years. The decadence of the stock business is marked by an increase in the interest of legitimate mining.

#### The Mining and Scientific Press.

Now that the mining season is about to open all over the Pacific Coast, it will be well for the miners to remember that in addition to the support they ought to give to their local papers, they should also lend their aid in maintaining the MINING AND SCIENTIFIC PRESS, which has for so many successive years been the representative of the mining industry on this coast. Our readers who have been with us so long should call the attention of others to the benefit to be derived from the PRESS. It is our endeavor to collate from all available sources, far and near, each matter as will be of interest and value to the mining community. We keep close watch on all improvements in mining, milling, etc., and describe what is being done, and where it is being done. We also give illustrations of each new mechanical appliances as are adapted to the wants of our Pacific Coast progressive communities.

In every number of the PRESS are several communications from different regions. This correspondence is specially useful to our readers, giving them as it does information concerning the camps from people who live there. Our regular two pages of mining summary gives in a condensed form the current news of large and small districts and camps, and serves to keep all interested well posted on what is going on.

The mechanical and scientific progress, engineering and other departments are carefully looked to, and such things are given as are of value and general interest. In short, it is the desire of the publishers and editors to make the PRESS a journal of practical matters which shall be useful to its readers.

The MINING AND SCIENTIFIC PRESS is the oldest paper devoted to mining in the United States. The experience of its conductors enables them to obtain the class of matter most desired by the mining communities. The mining industry has grown in importance of late years, and a wider range of subjects has been the result. Nevertheless we have endeavored to keep pace with the progress of the day, and feel assured that our efforts are appreciated. Many new-comers to the coast would be benefited by becoming regular readers, and we trust to our old subscribers to call their attention to this fact.

#### Trademark Infringements.

A case for infringement of a merchant's trademark was decided by U. S. Circuit Judge Sawyer this week in favor of the plaintiff. The suit was one where the name or trademark of a well-known manufacturer of hoots was placed on the hoots made by another firm. Some 250 dozen of the illegally marked hoots had been sold. The judge said that the defendants insisted that the measure of damages, or profits, should be limited to the difference in price for which the goods would sell with the trademark upon them and the price for which the same goods would sell without it. He was unable to adopt any such rule. It would be exceedingly indefinite and equivalent to giving no damages or profits at all. How would it be possible for any one to say how much less a pair of hoots or shoes would sell without than with the trademark upon it? There would be no definite measure of compensation for the injury. One who deliberately and knowingly uses another's trademark commits a palpable and unmitigated fraud, for which there is no possible excuse. He seeks to avail himself of the reputation of another's goods, usually, if not always, of an inferior quality, upon the market, thereby not only fraudulently cutting off the market from the party, who has, by years of labor and at great expense, established a reputation for his wares, but in addition to this injury destroys, or injures largely, that reputation which is the foundation for the owner's business, by selling inferior goods under his trademark.

In concluding his decision Judge Sawyer made the following very pointed remarks concerning improvements: "In my judgment the infringer should at least account for the entire profits made upon the goods wrongfully sold with the trademark impressed thereon. There

may also be damages beyond the mere profits resulting to the owner of the trademark infringed, which he may recover. I do not think there is any just analogy with respect to profits and damages between the infringement of a trademark and a patent for an improvement in a machine. A machine may embrace inventions for half a dozen improvements, for each of which there is a patent held by different individuals. One machine might infringe them all. In such case each would be entitled to recover the profits attributable to his own invention, and not the profits made upon the machine as an entirety. There is no analogy to such a case on the infringement of a trademark. The infringer fraudulently attaching another man's property to his own occasions only a confusion of property, with a view of taking advantage of that other's property. The trademark sells the whole article, however inferior and injurious in that particular, and prevents the sale of the owner's goods of equal amount. At least that is the fraudulent purpose and the natural tendency, whether always accomplished or not, and the injured party should have at least the whole profit resulting from the wrongful act, and such I understand and hold the rule to be. His damages may be more, arising from destroying the reputation of the goods. Let there be a decree for the complainant, in pursuance of the prayer of the bill."

#### The Dismemberment of Idaho.

That portion of Idaho which it is sought to have added to Washington Territory comprises within it the Coeur d'Alene and other important mining districts. Here the alien law is in force, the inhabitants, in the hope of relieving themselves from its restrictions, have very likely been induced to favor this annexation scheme, there being a good prospect that their neighbor on the west will soon be erected into a State and so escape the operations of this odious and impolitic law. But if this were the object had in view by these annexationists, the reason for their action fails now that the objectionable law, in so far as it applies to the purchase of mines, will undoubtedly be repealed by the present Congress.

Other than the above, we fail to see any good reason for the proposed mutilation of Idaho, the reasons why such measure should be defeated being many and obvious.

Idaho, at the rate she is progressing in population, wealth and improvements, will in the course of a few years be herself applying for admission to the Union. Her area is not much larger than that of Washington, the latter in her much greater extent of arable land possessing advantages that more than make up for this difference in size. But both of these Territories are now compact and symmetrical in shape, being bounded on nearly all sides by right lines. Violent curves and angles are avoided. At no point do unsightly protrusions extend into adjacent territory. To detach the northern end of Idaho and add it to Washington would alter all this, the area of the former being at the same time reduced to an objectionable extent.

It is desirable that Idaho as well as the other Territories occupying the great arid interior should include large areas within their boundaries, since none of them can ever become very populous, owing to the great amount of mountainous and unproductive land they contain. It is to be hoped, therefore, that the present dimensions of Idaho will suffer no curtailment. Than this, better take from Montana, her much larger neighbor on the east, a triangular strip of country, and add it to the "Gem of the Mountains," a measure which, besides more nearly equalizing the two, would somewhat improve the shape of both.

ONE of the Oakland ferry steamers is now lighted by electric lights, and the system is to be adopted on the other steamers. The Piedmont now has 140 electric lights of 20-candle power each. The relative cost of the light is said to be no greater for the 140 electric lights than was the expense of the 60 coal-oil lamps formerly used.

PROSPECTORS are at work in Siegel district, about 24 miles east of Virginia City, Nevada. Several abandoned mining claims in that vicinity have been relocated.



### The Spanish Tongue in California.

California, since the time of the American occupation, furnishes a notable example of the manner in which the spoken language of a people may grow and wane through the commingling of races speaking different tongues. Prior to the inauguration of the gold-mining era most of the Americans who had arrived in California found it convenient to gain some knowledge of the Spanish, not a few of them mastering it completely. Among the earlier immigrants nearly all the younger members learned to speak the Spanish fluently, the older picking up such words and phrases as were used in the transaction of business, and in conducting the more ordinary affairs of life. The two races saluted each other in either language, the Americans generally conforming to the Spanish mode, as, indeed, the latter people do not, nor have they ever taken readily to the English.

With the influx of immigration consequent on the discovery of gold, the English speedily became the predominating tongue, few of the newcomers trying to learn, or even paying any attention to the Spanish, as in fact there was no longer much need for their doing so. But while this language was so suddenly and almost wholly ignored, there had already been a great many Spanish words added to our vocabulary, some of them having been engrafted on it through sheer necessity, there being in the English no word for expressing the idea intended to be conveyed; and this for the reason that the thing itself had among the Americans no existence. They were obliged to adopt the terms corral, vaquero, rodeo, and the like, simply because there were no such things in the United States, nor had our people ever seen or heard of them. In like manner we had to adhere to the names given the trapping and implements

of the vaquero, and to the caparison of the caballero or horseman, such as tapajo, mochila, tapabero, cincho, lasso, etc. We had to continue calling a certain style of vicious animal a bronco, because the bucking horse was a brute unknown to our people and with which they had happily had no experience.

Some names at first adopted by the Americans have since been wholly or partially dropped and English ones substituted in their stead: *embarcadero* has, with few exceptions, given place to the English term *landing*; *punta* has in most cases yielded to *point*; *pueblo*, to *city*; *presidio*, to *garrison* or *fort*; *rio*, to *river*—and so in many other instances. In designating natural objects, we have sometimes shared the names with the Spanish; thus we have in California ravines and canyons, *arroyos* and creeks, etc. In this State we retain the Spanish name *salinas*, but in Arizona they call a stream marked by the same peculiarities *salt river*. The Spanish *los* has generally had to succumb to the English definite article *the*. Where retained, as in the case of Los Angeles, our people, yielding to the local instinct, manage to give to the *o* the short sound instead of preserving the long sound which that letter has in Spanish. When it came to gold mining, this being an entirely new industry with the Americans, our language was without the terms and the phraseology pertaining to that business, hence the Spanish names such as *placer*, *batea*, *aratra*, etc., were by us accepted and have since been retained. The practice common among miners in early times of rushing off hastily to new diggings having made necessary a term for expressing this peculiar phrase of mining life, the word *stampede*, a corruption of the Spanish *estampada*, was adopted and is still in use. As the practice itself is going out of date, so very likely will the word after a time become obsolete.

Formerly the word *Ranch*, a contraction of

the Spanish *Rancho*, was here in common use, being applied to every kind of landed estate. Since the large Mexican grants have been subdivided and the smaller holdings have come to be cultivated after the American fashion, the English term *farm* has in great measure superseded the Spanish *Rancho*, though chicken ranches, hog ranches, etc., still continue to be spoken of, and for designating these, the phrase is very convenient. Indeed we might well have retained much more which, in primitive times, we had the good sense to accept from that beautiful and expressive language, which, in so far as we have made appropriations from it, has greatly enriched without at all snuffing our mother tongue.

### Foundry Notes.

The Dow Steam Pump Works have placed a large new pump on board the tugboat *Alert*. It will furnish four 2½-inch streams and a cepec-

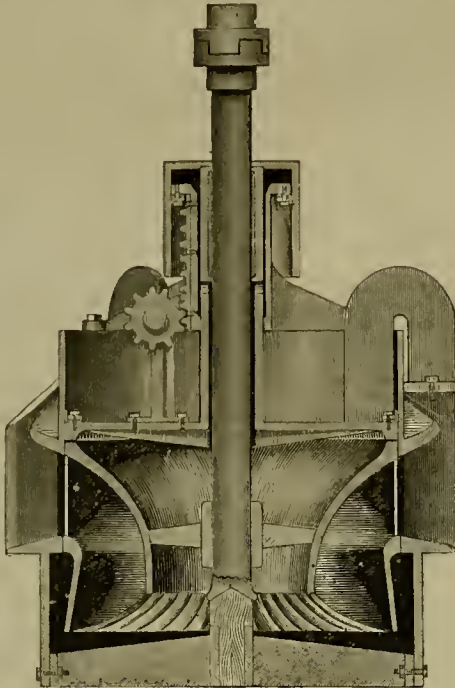


Fig. 3.—VERTICAL SECTION OF RISDON TURBINE WHEEL.

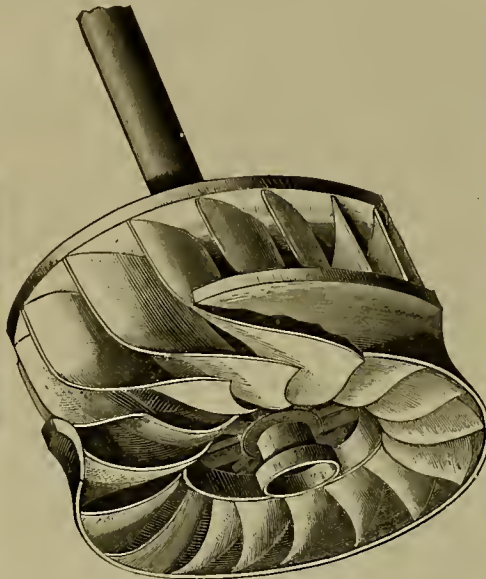


Fig. 4.—REVOLVING PART OF RISDON TURBINE WHEEL.

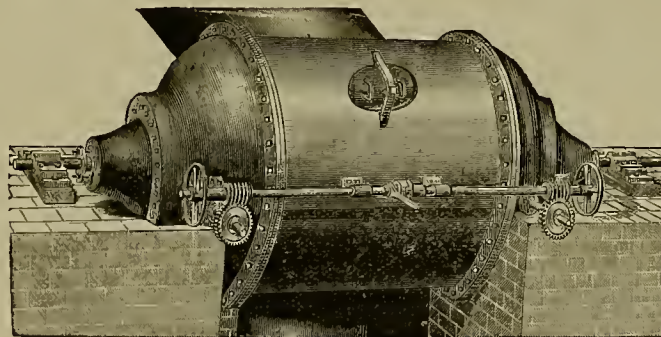


Fig. 5.—DOUBLE RISDON WHEEL IN ONE CASE.

ity of 18,000 gallons an hour. The new pump will be used for wrecking purposes.

At Garratt's foundry they are preparing designs for centrifugal pumps to be run by electricity for the Big Bend Tunnel Co. The pumps are to remove seepage water from the river-bed, after the main body of water has been turned into the tunnel. The pumps are to be run under rather peculiar circumstances, and are designed to meet requirements exceedingly varied, as respects the quantity of water to be handled.

The noise about iron foundries, iron mines, and other industries, to the tune of an investment of "at least \$1,000,000," at Chino has ceased, and the Los Angeles *Tribune* intimates that the aforesaid noise was only made for the purpose of selling town and villa lots, and that those lots having been disposed of, the noise will be heard no more forever.

A posse of men from Phoenix overtook and killed one of the Mexican murderers of Cyrus Gribble, superintendent of the Vulture mine, Arizona. They recovered the stolen billion and Mr. Gribble's watch. A search is still being made for the two other murderers.

COAL shows no change in prices. The week's receipts were 29,673 tons, of which only 3040 tons were foreign. A private circular says: The situation is unchanged. The arrivals are barely sufficient to supply pressing demands, hence last week's quotations are fully maintained with no evidence of weakening. The northern collieries are increasing their shipments, but not sufficiently to affect prices. Their late engagements of tonnage would indicate a further increased output, still no softening of values can be looked for until there shall be an accumulation of coal in the yards for distribution, instead of entire cargoes being delivered to consumers from ship's side as at present.

The hoisting works of the "Work Your Own Diggings" claim, Nevada county, were burned on Tuesday of last week. The fire is said to have been of incendiary origin. The fire came as a real calamity to the six young men who are the principal owners in the mine, as they

### Nevada County Miners.

Nevada county is the center of the gold-mining industry of this State. The quartz mines are rich and productive, and are, most of them, actively worked. The mills and metallurgical works are of the best and most skillfully conducted. And it is generally conceded that there are no better gold miners than can be found at Grass Valley and Nevada City. But there have of late been efforts to reduce miners' wages below the \$3 standard, and this has resulted in several unfortunate occurrences, such as the dynamite outrage at the Providence, Champion, and Mountaineer mines, and incendiaries at the "Work Your Own Diggings" hoisting works.

The Nevada City Miners' Union held a meeting on Thursday of last week, when the following expression of sentiments was passed:

"We, the undersigned laboring miners and residents of the Nevada City mining district, believe that considering the cost of the necessities of life in this locality and the peril to which miners are subjected, the special skill required, and the severity of the labor of our employment, it is our duty to protect against the reduction of the wages of skilled underground miners below \$3 per day for a good day's work. We believe that sum to be only a fair compensation, and that the wages of all other employees in and around the mines and mills should be in proportion.

"We further believe that it is our right, if we so desire, to organize and combine by lawful and honorable means to maintain wages at these prices.

"But while we so believe, we unhesitatingly declare that we unqualifiedly reject and repudiate all destruction or injury of property, by any purpose or means whatever, either to maintain wages or to accomplish other personal ends.

"And we further declare our purpose in common with other law-abiding and well-intentioned citizens, to use our influence to enpress and prevent all such violations of the rights and enjoyment of property by its owners, and that we will use all reasonable endeavors to detect and bring to punishment any and all persons who have engaged, or may engage, in such unlawful acts.

"We further declare that in our opinion it is as unjust to charge such evil actions to the miners, as a class, as it would be to call all merchants and tradespeople in the community cheats and dishonest because some few of them may have defrauded their creditors.

"Signed by the president and indorsed by the union. W. B. ROWE, President.

"T. C. WATERS, Secretary."

From this it will be seen that the union repudiates any connection of its members with the recent outrages. Of course the perpetrators are not known, though every effort is being made to ascertain their identity. No doubt the bulk of the miners in the community would like to see the persons punished who have thus thrown discredit on their occupation.

A delegation of about 100 members of the Nevada City union went to Grass Valley last Saturday night and held a meeting to urge the Grass Valley men to form a miners' union—a branch union. Speeches were made concerning the subject of wages. In Nevada City mining district the movement had been made to lower miners' wages to \$2.50, and to how much lower no one could tell. The entering wedge of low wages is \$2.50 a day. The union is resisting this, not by violence, not by unlawful acts, but by banding together and standing out boldly and aboveboard for a reasonable standard of \$3 a day to a skilled miner. Grass Valley miners were urged to join in, but they did not seem to do this very freely, according to the local papers. Only about 30 men signed the roll, but arrangements were made for another meeting in two weeks' time.

SILVER CITY, Idaho, is experiencing a revival. Its mining interests, like those of many other camps, have been depressed from the decline in silver and other metals, but a reaction has taken place which bids fair to make the camp as lively as ever.

THE 221st dividend paid by the Idaho Gold Mining Co., location of works, Grass Valley Mining district, Nevada county, California, aggregated \$23,250, making \$69,750 paid for this year. To date, the dividends paid aggregate \$4,777,000.

THE El Paso smelter people are in trouble over violation of the foreign contract labor law, in bringing 50 Mexicans over to work at the furnace.

WATER-POWER for mining is being introduced in place of steam in this State wherever practicable.

GOLD has been discovered in the Nipissing district, township of Cortier, Canada, within a mile of the Canadian Pacific track. The ore assays \$800 per ton.

WILLIAM F. SMITH, secretary of the California Academy of Sciences, has gone to the Sandwich Islands for a short vacation.

THE New Mexico Territorial mineral exhibition will be held at Socorro next May.



## MECHANICAL PROGRESS.

## Link Belts.

Link belts have come to stay, and as there is no patent on the link itself some new catch somewhere must be protected and fit the links so that they will run in a V groove of a pulley. By making one edge of the link thinner than the other the belt will become so much inclined on the sides that they will wind in the level score to a nicety.

In regard to the above we clip the following from the *Chicago Journal of Commerce*: Leather-link helting was unknown in this country previous to 1885, and although it had been in use in England and France for 25 years previous, it seemed unsuited to our swift running machinery. Mr. Chas. A. Schieren of New York went abroad several times, visited the leading manufacturing districts of Great Britain and the Continent, studied the manufacture of these leather-link belts, and resolved to introduce them into this country. He endeavored to improve these belts and make them suitable to be run on our machines, and in order to do this had several of them made and tested in his own extensive factories. He found that with a few necessary improvements they could be made to do excellent work on our American machinery. Many valuable improvements were invented by him, such as the American patent joint. This joint gives the belt an unbroken, flat surface, and just pliability enough to conform itself to the rounded face of a pulley.

Two bolts are used for each width of belt, allowing the belt to adjust itself to any pulley, whether flat, crowned or cone. The English use only one bolt for each width of belt. By this method the bolts must bend to the rounded face of the pulley before perfect contact can be secured, and in many cases the bolts refuse to bend and therefore break off. Since the introduction of the joint, link belts have been run on all kinds of machinery with great success. They have, moreover, decided advantages over ordinary helting. Every foot of belt is of exactly the same weight; the belt, therefore, runs smoothly. They are claimed to be much more pliable than ordinary belts, to be more easily adjusted to the pulleys, to save cost of lacing, belt hooks, etc., and to stand more strain and last longer than two ordinary belts.

ANOTHER WONDERFUL INVENTION which it is supposed may largely supersede the telegraph and telephone has recently been perfected by Professor Elisha Gray of Chicago. Prof. Gray, it will be recollected, is one of the parties who claims priority over Bell in the telephone invention, but who was not made a party to the recent suit which Bell has won. Prof. Gray, in a recent interview, spoke of his invention as follows: "By this invention you can sit at your office in Chicago, write a message to me, and as your pencil moves a pencil here in my laboratory moves simultaneously and forms the same letters and words in the same way. What you write in Chicago is instantly reproduced here in fac-simile. You may write it in any language, write in shorthand if you like, use code or cipher—no matter what, a fac-simile is produced here. If you wish to draw a picture, the same picture is reproduced here. An artist can by this device telegraph his pictures as a reporter telegraphs his description in words. The two pencils move synchronously, and there is no reason why a circuit of 500 miles cannot be worked as easily as one of 10 miles. It leaves a record at both ends and there can be no dispute about what is said. The writer's pencil is attached to two wires, which regulate the currents controlling the pencil at the other end. The invention will cost only about \$20, and is easily kept in order." Prof. Gray has also just completed an automatic switch-board for telephone exchanges, by which use of a telephone or telegraph he can put himself in communication with any other instrument. By this invention one person in an exchange can do the work of 30 or 40 under the present system, duties being merely to keep the automatic apparatus in order. The decision of the Supreme Court in the Bell case the other day does not interfere with Mr. Gray's claim to priority on the invention, and the professor's case will be pushed as fast as possible. He is backed by Lyman S. Sage of the Chicago bank and other substantial capitalists. The professor was not a party to the recent suit.

CASTING IRON IN A MAGNETIC FIELD.—A correspondent of the *American Machinist* says: "I would like to know if any reader of the *Machinist* has ever tried the experiment of making iron or steel castings by surrounding the flask with a powerful electro-magnet during the pouring process, or if it is known what effect would be produced upon molten iron or steel treated in this manner. If additional strength or improved polarity in dynamo castings can be obtained, it will amply pay for the experiment, which can be cheaply made in foundries where electric-light plants are in use. Will some one try it and publish the result?" The above inquiry is a very interesting one and the experiment should be made, especially since it can easily be done. The effect of the magnetic field upon certain liquids is well known. Solutions of various kinds, when exposed in the magnetic field, deposit crystals in a much shorter time and in a much more perfect manner than when otherwise exposed. It is more than

probable that molten iron or steel cooled—crystallized—in a magnetic field will take on some qualities quite different from iron or steel cooled in the ordinary way.

NATURAL SCULPTURE.—Though the Yellowstone Park is, so far as we know, the most remarkable geological and scenic region on the earth, there are other spots of very exceptional geological interest, notably Mount Rorosema in British Guiana. The summit of this mountain is a curiosity in aerial denudation. A traveler who has ascended that mountain says: "Our first impression was one of inability to grasp such surroundings; the next, that one was entering on some strange country of nightmares, for which an appropriate and wildly fantastic landscape had been formed, some dreadful stormy day, when in their midnight career, and broken, elastic clouds had their stiffened in a single instant into stone. For all around were rocks and pinnacles of rocks of seeming impossible fantastic forms, standing in apparently impossible ways, seeming to defy every law of gravity—in groups, singly in terraces, etc.—rocks as walls, as terraces, as pyramids, as caricatures of the faces of men and forms of animals, umbrellas, churches, etc. No tree or animal life was visible. Look where one would, on every side it was the same."

ANTI-FRICTION BEARINGS.—A recent invention of this kind, according to the *Boston Journal of Commerce*, is attracting considerable attention, the mechanism being designed for vertical shafts that revolve at a high rate of speed and are required to support considerable weight. Briefly, below a collar secured by set screws the shaft passes through a pillow block and terminates in a step which consists essentially of a hollow casting within which the shaft guiding socket fits; the socket is so formed that there is an annular oil-chamber above the socket, fed by proper oil ducts, and, about in line with the bottom of the shaft, there are two oil ducts leading from the chamber to the interior of the socket. The step simply acts as a guide for the lower end of the shaft, and not as a weight-supporting device, the weight of the shaft and its load being taken up by a series of anti-friction balls that rest within a groove formed on the upper side of the pillow-block, a corresponding groove being formed on the under side of the collar. The box to which the pillow is bolted is provided with three or more converging slots in which are adjustable blocks made of any of the anti-friction bearing metals.

CONVERTING COMPOUND INTO TRI-COMPOUND ENGINES is being steadily pursued by the directors of the Union Steamship Company of England. The R. M. S. Moor has just had her engines converted to the triple expansion system, making the fifth of the company's mail steamers which have been so dealt with. The Moor underwent her speed trial at Stokes Bay on the 15th of February, when she attained a mean speed of 16 knots per hour, and indicated 4532 horse-power. The engines worked at 70 revolutions per minute, with a pressure of steam in the boilers of 160 pounds per square inch. Compared with the Moor's performance on trial with compound engines, this shows an increase in speed of over three-quarters of a knot per hour, and an additional 232 indicated horse-power.—*Engineering*.

AN EMERY FILER.—An ingenious device for stretching emery cloth for use in the workshop consists of a couple of strips of wood about 14 inches long, hinged longitudinally, and of round, half-round, triangular or any other shape in cross section. On the inside faces of the wood strips are pointed studs, taking into holes on the opposite sides. The strip of emery cloth is laid on to one set in the studs, and the "file," as it is called, closed, which fixes the strips on one side. It is then similarly fixed on the other side, and thus constitutes what is called an "emery file," and which is a handy and convenient arrangement for workshop use.

It is not generally known that steel, when hardened, decreases in specific gravity, contracts in length and increases in diameter.—*The Engineer and Iron Trades Advertiser*. True, it is not generally known, and for the very good reason that it is not true, but that, on the contrary, no one can tell, beforehand, what effect hardening will have upon the dimensions of a piece of steel. Sometimes it will be longer and sometimes shorter—sometimes larger in diameter and sometimes smaller in diameter. Nothing is "generally known" about it, except that not much of anything is known.—*Am. Machinist*.

AN ANTI-BELT FRICTION PULLEY.—Belts conveying power are very apt to slip on pulleys, but a new pulley has been devised to prevent this. The pulley is covered with perforated sheet iron one-sixteenth of an inch thick, which is riveted to the pulley. The tension on the belt causes it to slightly grip the holes, and thus slipping is avoided, while at the same time the pulley is strengthened.

THE LARGEST BRASS CASTING that was ever molded in Pittsburgh was recently cast at the foundry of Mansfield & Co., in that city. It is what is called a "liner" for the inside of a large steel cylinder. In shape it resembles a thimble, and is put in the cylinder to give more strength to the steel. The weight of the casting is between 6000 and 7000 pounds.

## SCIENTIFIC PROGRESS.

## The Water of the Ocean.

The water of the ocean is generally of uniform saltness, but there are some localities which are saltier than others from some local cause, like masses of salt rock at the bottom, as in the Dead sea. The water of the Red sea, under the large evaporation from its surface, from the intense heat of the locality, and from the further fact that there are no large rivers flowing into it, is very salt and growing constantly saltier from year to year. In all probability it will in time become as salt or saltier than the Dead sea, or the Salt lake of our own country. Usually, a pint of sea water will yield an ounce of salt. It also contains a small quantity of sulphate of magnesium, sulphate and carbonate of lime, iodine and bromide of magnesium.

Sea water, inclosed in a bottle, is colorless. When looked at in a mass it seems a peculiar green; when viewed from a distance it is blue—"The deep, blue sea." In the tropics and some parts of the Mediterranean, along the Eastern shore, it is indigo blue. In other places it is a deep green; in still others, a slate gray. "Fickle as the sea" is true of its color, as of the changes on its surface. In some places the water is black; in others, white or beautifully transparent. In the fjords, off the coast of Norway, the water is marvelously clear and transparent. At the depth of 25 fathoms the smallest object can be seen on the sandy bottom. The water magnifies as the lenses of a microscope. According to one writer, the polar oceans are a very beautiful blue, while in the bay of Naples the rays of the sun, falling upon the water, cause it to sparkle as flakes of silver. The Black sea derives its name from the storms and tempests that sweep over it, while the White sea gets its name from great masses of floating ice.

The natural color of the sea is often modified, moreover, by the presence of animal and vegetable life. Hence it is that certain parts become, at times, milk white, while at other times and places the water is red as blood, as though the sea had ruptured an artery. This change in color is due to masses of seaweed, which float upon and near the surface. The Red sea often appears like a restless, tossing sea of blood, while a few years ago the Atlantic was covered with a dark purple mantle, which extended over many square miles. In ancient times this phenomenon was believed by nervous and superstitious persons to portend some awful calamity and visitation of the Divine anger and judgment. But science has solved the dark, portentous mystery, and quieted people's nerves by showing it to result from innocent and harmless causes. The black mud and yellow sand at the bottom of the ocean, as well as the color of the sky overhead, have very much to do with the appearance of the water. In some regions, as in the neighborhood of the West Indies, the water is so marvelously transparent that ships sailing over the surface appear to hang suspended in the air, and plants and animals are plainly seen on the bottom.

It is probable that the water has a color of its own, which is either blue or green. At night, and when roughened by wind or the passage of a vessel or dip of oars, the ocean sparkles and flashes as though on fire. In the Southern seas, sailors tell of halls of fire that roll over the waves, and of cones of fire, and of glittering serpents, chasing each other and wriggling and crawling with their fiery crests and flashing tails. All this illumination and glare is caused by the presence of phosphorescent animals that crowd by millions every drop of water and flit over the waves, lighting them up as with internal fire. Every drop of water is alive and seems to crawl and hum with these little flashing animalcules.

BALLOONING WITHOUT LOSS OF GAS.—There is much mysterious talk in military circles (says a Paris correspondent) of a balloon, the invention of a M. de Villars, in which the problem of aerial navigation is said to be solved, at least to a degree never yet reached. M. de Villars' aim has been to direct his balloon by taking advantage of the several air currents which are to be met with at various heights. To do this, it is necessary to ascend and descend frequently in the course of a voyage. But with balloons of ordinary construction this is impossible, by reason of the loss of gas and ballast which such maneuvers occasion. M. de Villars has no ballast to throw away, and he is able to retain the whole of his gas. Here lies the invention, which is kept profoundly secret. The inventor has, it is said, sold his secret to the French Government, to be used by it alone. Leaving out this part of the device, I may describe the balloon as consisting of a double envelope of calico, covered with a special varnish to afford greater security to the aeronaut and to render leakage of gas impossible. The additional weight thus occasioned is compensated by making the net of a new sort of fiber, which, while being twice as strong as hemp, is only half the weight. The car, which is attached in the usual manner, is described as cylindrical-conical, and is furnished with an electric motor driven by a dry battery. This motor will actuate a screw propeller, to be used only when it becomes necessary to temporarily direct the course of the balloon.

THE ELEMENT FLUORINE.—The three great things sought for by the ancient alchemists

were the philosopher's stone, the elixir of life, and the universal solvent. The last of these, though long known to modern chemistry, has just been separated, but cannot be retained simply because it attacks or destroys everything. It has sometimes been termed "the fury of the chemical world." It is, in fact, an element known as fluorine. A writer describes it as follows: It exists peacefully in company with calcium in fluor spar and also in a few other compounds, but when isolated, as it recently has been by M. Henri Moissan, is a rapid gas that nothing can resist. It combines with all the metals, explosively with some, or if they are already combined with some other non-metallic element, it tears them from it and takes them to itself. In uniting with sodium, potassium, calcium, magnesium and aluminium, the metals become heated even to redness by the fervor of its embraces. Iron filings, slightly warmed, burst into brilliant scintillations when exposed to it; manganese the same. Even the noble metals, which, even at a melting heat, resist the fascinations of oxygen, succumb to this chemical siren at moderate temperatures. Glass is devoured at once, and water ceases to be water by contact with this gas, which, combining with its hydrogen, at the same moment forms the acid, glass-dissolving hydrofluoric acid, and liberates ozone.

WIND MADE SOIL.—Water is not the only physical agent concerned in carrying the earth's solid materials from place to place, modern investigations proving that the dust carried by the wind produces astonishing changes in the configuration of the land. The thick deposits covering ancient ruins are now believed to have been largely brought by the air. A French geographer, M. Violet d'Aoust, after referring to Richthofen's description of a vast aerial soil formation in China, mentions having seen on the flanks of high mountains in Mexico clay strata not deposited by the waters nor by the decomposition of the rocks, but produced by the dust raised from the plains by the winds and left on the hills. These deposits vary from 100 to 300 feet in thickness, growing finer with increase in height, and ceasing at the limit of vegetation. The peninsula upon which San Francisco, with its hills and mountains, lies, was, no doubt, built up in this manner by the western winds which blow so heavily and so constantly inland from the ocean. The heavy surf which beats upon the coast throws up immense quantities of sand, which, as soon as dry, commence to travel inland before the wind. This movement can even now be watched all along the coast line between the city and the shore. The tops of hills from 20 to 50 feet or more high can be seen to be moving inland from year to year by the sand upon the western side blowing over the summits and resting upon their eastern slopes. Evidences of the action of the wind; in disintegrating the soft sandstone of the hills are to be seen in innumerable places on the "plains" on the eastern slope of the Rocky mountains.

HOW TO LIGHT A LAMP WITH A SNOWBALL AND THE LIKE.—When a small piece of potassium, the size of half a grain of corn, is dropped into a tumblerful of water, some of the oxygen of the water leaves its hydrogen, owing to the intense heat which the chemical action produces, and combines with the metallic potassium, causing a violet, bluish flame. When the piece of potassium is placed on the wick of a coal oil or alcohol lamp the flame produced by touching the potassium with a bit of snow, or ice or a drop of water, will inflame it. Fire under water can be produced by placing a small piece of phosphorus in a conically shaped glass filled with water, and some crystals of chlorate of potash covering the phosphorus, and then pouring through a long funnel, or a glass tube, a few drops of sulphuric acid down on the mixture at the bottom of the glass. Tongues of flame can be seen flashing up through the water. The intense chemical action produces sufficient heat to inflame the phosphorus under the water. Where there is sufficient heat and oxygen fire will burn, whether in air or water.

THE SITE OF AN ANCIENT EGYPTIAN LAKE.—The Government of Egypt has been persuaded to make surveys which prove the existence of a depressed region nearly 60 miles long by 20 miles wide, reaching a depth of 250 to 300 feet below high Nile. This depression has for several years been held by D. Cope Whitehouse to be the site of the wonderful artificial Lake Moeris, described by Herodotus—fictitiously, many have believed—with a circumference of 450 miles. The interest at last aroused in Egypt makes it probable that the Nile will soon be admitted to this valley by a canal 11 miles long. The creation or restoration of this great artificial lake will give fertility to a wide area and reduce the annual inundation of the Nile while storing water to replenish the river in dry seasons.

WASPS' NESTS.—It is a curious fact that wasps' nests sometimes take fire, as is supposed, by the chemical action of the wax upon the material of which the nest is composed. Undoubtedly many fires of unknown origin in haystacks and farm buildings may thus be accounted for.

WOMEN are gradually becoming active in scientific work. The Royal Geographical Society has decided to admit them to fellowship, and other prominent societies will shortly follow the example.



## USEFUL INFORMATION.

**INDIA RUBBER HORSESHOES.**—The proposed substitution of india rubber for metal in the manufacture of horseshoes is based upon various supposed advantages, one of these being that the former enables a horse to go easily over all kinds of roads and rough or slippery ground without slipping. The contrivance brought forward for this purpose is such as to obviate in one instance the necessity of using an iron shoe, and be moved momentarily when the horse is not traveling, and can also be used when the horse is shod with an iron shoe. According to this design the shoe consists of an india-rubber bottom piece molded to fit over or round the frog and the hoof, with a ledge or projecting rim rising up the front and around about level where the nails are clamped, the projection having an edging under which a steel band or other appliance can be drawn and nipped tight to retain the rubber shoe. The band is connected by studs, which pass through the heel part of the hoof, this being cut away from the inner side for the purpose, and the stud or studs may work eccentrically to obtain this grip or fixing. If the rubber shoe is used with an iron shoe, the frog portion or pad has a front plate and two side wings partially imbedded in it, the projecting taking under the iron shoe to fix the rubber shoe in place. If the rubber shoe be divided or made thin in the center, a swivel or other bar can be contracted from the rear to reduce the width of the pad so that it enters easily, and also expended so as to fix the rubber shoe in position.

**HOW THE AIR-BRAKE WORKS.**—Not one in a hundred, even of those who travel much on railroads, probably know how the pressure of air is used to apply the brakes to a train. When the air-brake was first invented the air was turned into the cylinder under each car when the car was to be stopped, and the pressure was exerted to force the brakes up against the wheels. But at the present day the brakes are held against the wheels by springs, and the air is turned into the cylinder to push the brakes away from the wheels as long as the train is in motion. When it is desired to stop the train the air is let out, and then the springs apply the brakes and stop the train. This last method of using air pressure has great advantage over the old way on the score of safety. Whenever an accident happens to a train one of the first effects it is apt to have is to rupture the air-pipes leading from the engine to the cylinders under the cars, and that of itself stops the train instantly. It is very important for everybody to understand this matter, because a child five years old can stop a train in 30 seconds from any car in the train if he simply understands how. You will see, if you look for it, that there is a sort of rope projecting from the toilet-room of every car. That connects with the air pipes under the train. If you catch hold of it and give it a little jerk it will stop the train before it has gone 200 yards.

**A FAIR IMITATION OF LEATHER** is being made from parchment paper, by which is understood a paper that has been rapidly run through strong sulphuric acid, then passed between rollers to get rid of as much of the acid in that way as possible; next through water to wash out as much acid as can be washed out of the remaining acid; and finally through ammonia water to neutralize the last remaining traces of the acid. In the latter processes the paper is handled by being run in a continuous roll. The grained appearance of leather is given to the acid-treated paper by passing it, while damp, between rollers, one of which has the indentations required in its surface. The designs for the latter are obtained by the electrolytic process from a real skin. Having been indented so as to closely resemble leather, the parchment paper is stained or dyed any desired color; then, like the leather which it closely imitates, it may be glued, gilded, pressed or stamped. It is used advantageously as a substitute for leather in the binding of books, as it possesses no small degree of strength and stands wear remarkably well.

**CORRECTING DARK SHADES IN DYEING.**—Manufacturers will complain and ask how it is that when a certain shade has been got with a given weight of dyestuff upon a given weight of wool the same weights cannot be got to give the same shade at another time. "I have had," says the practical man, "many a talk with people who have no idea of the difficulties of dyeing, and it is hard to make them understand that with the same quantity of wool and the same amount of mordant and dye there will be, or there can be, differences of shade. It is well known that such a thing happens every day in the dyehouses. A coarse quality of wool, for example, requires only two-thirds of the materials required by a finer sort of wool. The best and easiest way for the dyer when he is uncertain is to take care not to use too much dyestuff, in the first instance, for at least it is possible to make the shade darker by addition of logwood, peachwood or fustic; but if the shade comes up too dark it is no easy job to make it lighter."

**INCANDESCENT LAMP GLOBES.**—The common practice of surrounding incandescent lamps with opal globes, or globes of ground glass, leads to a loss in the one case of from 40 to 60

per cent of the light, and in the other of from 25 to 35 per cent. A simple method by which the character of the light can be softened without experiencing so great a loss of intensity has recently been proposed, and consists in covering the globe of the lamp with a film of ordinary collodion, which can, by adding successive films, be made of any desired thickness. The reduction of the light of the lamp does not, it is said, with this method exceed ten per cent, and the system possesses the further advantage that the film can at any time be removed by simple friction.

**ANNEALING STEEL.**—For small pieces of steel, take a piece of gas pipe two or three inches in diameter and put the piece in it, first heating one end of the pipe and drawing it together, leaving the other end open to look into. When the piece is of a cherry red, cover the fire with sawdust; use a charcoal fire and leave the steel in over night.

**TO HARDEN COPPER.**—Melt together and stir until thoroughly incorporated copper and from one to six per cent of manganese oxides. The other ingredients for bronze and other alloys may then be added. The copper becomes homogeneous, harder and tougher.

**TESTING RAILWAY TIRES.**—In a machine for testing steel railway tires, in use in France, a succession of blows, similar to those delivered by means of a sledge-hammer, are given to the tires, in place on their wheel centers and revolved on rollers.

**SHEET-STEEL** is now copper-plated on both sides by electro deposition and used as sheet-copper. The sheet is decarbonized steel, and one of the copper sides is tinned. The new material is manufactured at Pittsburg, Penn.

**"STRAP" OR BELT.**—In the nomenclature of mechanics nothing strikes an American mechanic as being more odd than the English use of the word "strap" for what we call a belt.

## GOOD HEALTH.

## The Nervous American Temperament.

We are emphatically a people of nerves. Visitors from other lands are astonished at the fierce activity that pervades our most insignificant actions; but they themselves speedily contract restlessness and no longer marvel at wonderful developments of invention and speed of practical application. A portion of this great energy is doubtless due to American climate, which teaches in a vigorous and obtrusive manner that quiet and rest do not form part of nature's law in this country, but it is far more a result of our newness, our youth in the family of nations. Scarcely out of the swaddling clothes of history, we are called upon to stand up squarely in competition with a thousand years of past, and show the old fogies a new thing or two. And we have done it, are doing it now and apparently have shouldered a contract to keep in the lead for all time to come. What with new instruments of annihilation of time and distance, limited express trains across the Continent and unlimited chances for express speed in dissipation, the American temperament has already grown to be one great delicacy of nerve. Our children, at an age when their contemporaries in other lands are still at school, relegate the "old folk" to the rear; the father's opinion is voted as "good, of course, but belongs to the past period." Yet, in all this mad speed there is reason. It does not follow that we live shorter lives than elsewhere, even in length of years; that is not the case. We are not less capable of keen appreciation of good things, when once they are introduced to us; on the contrary, we are apt to see beauty and say so, too, when not even a glance of pleasure shows that our slower neighbor has noticed it. But from a medical point of view our temperament is a dangerous one to the State, in that it does most distinctly repress reproduction. The future American will be conglomerate; the blood of our forefathers will be so far diluted that its characteristic will be lost in foreign overflowing tide, which, if sluggish in its flow, may still be of service by reclaiming from too much nervousness our fidgety people.—*American Magazine.*

## Stooping Forward.

We clip the following from the London *Lancet*: Every one knows that stooping forward partially after rising quickly from bed in the morning, when the stomach is empty and the heart has less than ordinary support from the viscera below the diaphragm, is very apt to occasion a form of faintness with vertigo not unlike that which occurs in seasickness. The peculiar forms of headache distinctly caused in this way when the head is long leaned forward on the chest, bending the neck on itself, cannot fail to occur to every one; nor will the high tension of the eyeballs, the turgid and heavy eyelids, the snuffing nose, the deafness with buzzing or throbbing in the ears, the heavy breathing, and the puffed and perhaps flushed or darkened color of the face, resulting from the obstructed venous circulation through the bended neck, be forgotten. There are other and

more perilous, though secondary, effects of bending forward when the heart is weak, or the blood-vessels are not so strong as they ought to be, which should not be overlooked.

The weakly, and those who are not unlikely to have hearts readily overburdened, and blood-vessels easily stretched beyond recovery, or even ruptured, should be warned quite as earnestly against suddenly assuming or too long retaining postures which do—however slightly or partially—impede the return of blood through the veins. Probably few postures commonly taken up by the persons who lead somewhat sedentary lives are so prone to do mischief unnoticed as that of "leaning forward" when at work at a table which is not sufficiently high to insure the head being raised so that the veins of the neck may not be in any way compressed, or the return of the blood from the head embarrassed or delayed. We see reason to believe that if this apparently small matter were more generally understood there would be fewer head and heart troubles, and we will go so far as to say that some lives now lost would be saved.

**SIMPLE REMEDIES.**—When stung by a bee or wasp, make a paste of common earth and water, put on the place at once and cover with a cloth. For a cold on the chest a flannel rag wrung out in boiling water and sprinkled with turpentine laid on the chest gives the greatest relief. When a felon first begins to make its appearance, take a lemon, cut off one end, put the finger in, and the longer it is kept there the better. For a cough, boil one ounce of flaxseed in a pint of water, strain and add a little honey, one ounce of rock candy and the juice of three lemons; mix and boil well. Drink as hot as possible. Often after cooking a meal a person will feel tired and have no appetite. For this, beat a raw egg until light, stir in a little milk and sugar and season with nutmeg. Drink half an hour before eating. For a burn or scald, make a paste of common baking soda and water; apply at once and cover with a linen cloth. When the skin is broken, apply the white of an egg with a feather; this gives instant relief, as it keeps the air from the flesh. At the first signs of a runround take a cup of wood ashes, put in a pan with a quart of cold water, put the pan on the stove, put your finger in the pan, keep it there until the water begins to boil, or as long as it can be borne; repeat once or twice if necessary.

**SLEEP A MECHANICAL OPERATION.**—A writer on the philosophy of sleep declares that sleep is prevented by an excess of blood in the brain, and proposes as a remedy to pump the blood back from the brain by a peculiar mode of breathing for which directions are given as follows: Having assumed the usual posture for repose, the person is to inhale and exhale slowly and steadily in long breathes, devoting the whole attention to making the inhalations and exhalations exactly the same length, the length to be much greater than that of ordinary breathing, though not sufficient to disturb the circulation by working the lungs to their full capacity. In support of this theory reference is made to the feeling of faintness by filling the lungs with all the air they will hold, and then expelling it, repeating the operation rapidly three or four times; the resulting faintness is attributed to the withdrawal of blood from the brain, and the same effect substantially follows any sudden and extreme emotion. So violent a disturbance of the system, however, is not advised for the purpose here sought, but a steady and gradual diversion of the blood from the brain to the lungs and body.

**THE DOCTOR IN THE FAMILY.**—Dr. H. C. Sawyer, in his late book on nervous impairments, says of the doctor: The doctor should come and go like the clergyman and the priest, instead of being a necessary evil, whose visits are avoided as long as possible, and which are a source of uneasiness when necessarily multiplied. He should be a minister and guardian of health, an officer of the family, upon whose special wisdom free, early and constant reliance is placed. The eradication of inherited tendencies to disease, the direct improvement of the physical and mental measure of stocks, the development of a hardy constitution in weak children, the recognition and arrest of many fatal organic diseases in their incipency, before they are too old to be controlled, the arrest of acute inflammations, at a time when this is possible, the insuring of longevity and a sound old age—these are some of the things which the physician of to-day is able, but which he is not often permitted to do.

**TREATMENT OF SCIATICA.**—Some time ago M. Debove announced that he had been able to afford marked relief in a case of obstinate sciatica by means of a spray of chloride of methyl applied along the course of the sciatic nerve in the unaffected member. At a recent meeting of the Societe de Biologie, M. Raymond reported that he had obtained favorable results by a similar method in three cases. He found, however, that the effect was the same even when the spray was directed to any part of the limb, and not necessarily along the course of the sciatic nerve. This would seem to prove that the relief of the pain was due to an impression made upon the spinal center by refrigeration of the peripheral nerve terminations, rather than to a direct influence exerted upon the trunk of the affected nerve itself or of its fellow in the opposite limb.

## Steam Boilers.

## Amendments to the Regulations of the Supervising Inspectors.

Several changes have been made by the Board of Supervising Inspectors of Steam Vessels in the rules governing the construction of boilers. The sections amended are as follows:

**SECTION 6.** No braces or stays hereafter employed in the construction of boilers shall be allowed a greater strain than six thousand (6000) pounds per square inches of section, and no screw stay-bolt shall be allowed to be used in the construction of marine boilers in which salt water is used to generate steam, unless said screw stay-bolt is protected by a socket. But such screw stay-bolts without socket may be used in staying the fire-boxes and furnaces of such boiler, and not elsewhere, when fresh water is used for generating steam in said boilers, and no brace or stay-bolt used in a marine boiler will be allowed to be placed more than 8½ inches from center to center. In allowing the strain on a screw stay-bolt, the diameter of the same shall be determined by the diameter at the bottom of the thread.

**Sec. 9.** Third example, paragraph 3 and 4.

Paragraph 3. Lap-welded flues used in boilers carrying 100 pounds of steam or less, any flue over 10 feet, and not over 15 feet in length, shall have two wrought iron rings attached to the flue externally, equidistant between the ends of the flue, and there shall be attached one additional ring for every five feet, or fraction thereof, over 15 feet in length.

Paragraph 4. All such rings shall be good and substantially made, and properly and securely attached to the flue, and shall have a thickness of material of not less than the thickness of the material of the flue, and a width of not less than 2½ inches. Lap-welded flues used in boilers carrying over 100 pounds of steam, shall have rings attached, as called for above, of not less than one and one-half (1½) the thickness of the material of the flue, and a width of not less than three (3) inches. Provided, however, where such flues are made in lengths of not over five feet, and fitted one into the other, and substantially riveted, the wrought-iron rings may be dispensed with.

**Sec. 12.** The feed-water shall not be admitted into any boiler, used in connection with a condensing engine, at a temperature less than 100° Fahrenheit, and any boiler used in connection with a non-condensing engine, at less than 180°. And no marine boilers shall be used without having proper auxiliary appliances for supplying said boiler with water, in addition to the usual mode employed.

**A GIANTIC LOAD OF LUMBER.**—The *Northwestern Lumberman*, of recent date, said: When it was announced in the *Lumberman* that the barge Wahnapitac had carried a cargo of 2,181,000 feet of lumber, letters were received asking if it was not a typographical error. It was thought by many that no boat could carry such a load. For the purpose of showing the barge on paper, a photograph was obtained of her when loaded at Duluth. The freight rate to Tonawanda was \$3.75 a thousand, which footed up to a total of \$8178.75. The owners of the boat, however, were not satisfied with such a record, and proceeded to break it by loading at Duluth 2,409,800 feet of lumber, which also went to Tonawanda, and which is put down as the biggest cargo of lumber on record. At the latter place the cargo was unloaded on Saturday afternoon and Monday forenoon—one working day. It will be readily understood that the money-making capacity of the barge is of the Jumbo order also. The barge is owned by the Saginaw Lumber & Salt Company and the Emery Lumber Company, and cost \$30,000. She is 275 feet long and 51 feet beam. The lumber on her was piled 22 feet high and she drew 11 feet of water. Had she been 10 inches wider, she could not have passed through the Soo canal. The boat was built on the Saginaw river a year ago last winter, and was designed for carrying logs from the Georgian bay to the Saginaw river and Tawas mills. The Canadian Government, however, increased the export duty on logs, and the barge was put into the lumber carrying trade.

**NEW HOPE FOR CONSUMPTIVES.**—Each year brings new hopes for consumptive patients, and some eminent men think that the discovery of a remedy for this too common disease is now but a matter of time. Garcin has found that inhalation of air containing a small amount of hydrofluoric acid gas has a remarkably good effect on consumptives. Of a hundred cases so treated, 41 per cent improved and 38 per cent were cured. Hydrofluoric acid kills the bacilli of disease, and as phthisis is caused by the presence of these lower germs of life in the lungs, their destruction removes the cause of the disease. Hence, if the patient is not too far gone, it is reasonable to expect an improvement.

**SINCE** redwood has come into use for making furniture it has advanced greatly. A few years ago the kind used for furniture could be bought for \$10 a thousand, and now it is \$90 to \$100. The burl or knob which appears like excrescences on the trunk are worth \$250 per thousand.

The Granite Mountain Mining Company of Montana paid a dividend of \$200,000 on the 9th, making \$600,000 this year and \$4,200,000 to date.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

KENNEDY.—Amador Dispatch, March 20: All the necessary arrangements for sinking the main shaft of the Kennedy mine a few hundred feet deeper, such as cleaning out the sump, making and preparing water tanks, etc., have been about completed, and the process of sinking will at once be vigorously pushed forward.

NOTES.—Amador Ledger, March 24: On Monday Sheriff Adams sold on the ground at Quartz Mountain the personal property belonging to the Gold Mountain Overplus mine, consisting of ten-stamp mill and other mining machinery. The property was sold to T. H. Goodman, owner of the real estate, for the sum of \$250, about sufficient to cover the amount of judgments and costs. It is reported that this litigation being settled, the mine will again be started.

SOUTH SPRING HILL.—We are informed that a shaft in the machinery at this mine broke Wednesday, bringing underground works to a standstill until the same can be repaired, which will be no doubt in a few days.

## Butte.

MAGALIA RIDGE.—Cor. Oroville Register, March 22: The owners of the Aurora mine have put on a force of men this week. They have been getting the tunnel in shape for some time past to work the mine to better advantage than it has hitherto been worked. The owners of the Pershbaker or Magalia mine expect to reach the face this week. They have been at work draining the tunnel for the past three or four months at a cost of between \$6000 and \$8000 and now are just about ready to begin taking out gold. A new company has been organized to work the Meredith ledge in the vicinity of Lovelock. A new mine has been located by Messrs. Kitchen, Church and others, east of the Calamity mine in the neighborhood of Magalia. Saulsbury & Callahan, who had the Brandt ledge bonded, have rich prospects and are now sinking on the ledge. Some of the rock they are taking out would run as high as \$10,000 a ton. Another prospect struck about half a mile from the above by Henry Riffe shows thread gold as far down as they have sunk on the rock. The Alki mine, about 2½ miles from Magalia, is being pumped out and a force of men will at once be put to work. Of this mine Mr. George Perry is the principal owner and superintendent. The Calamity mine will start up in a few days. The prospects are good in this mine. Work has commenced in the Orofino mine near Nimsbaw. In the vicinity of Toadtown, Sol Petit has struck a fine prospect in quartz, while Wash Henderson has discovered a fine prospect near the Saulsbury property.

## Calaveras.

TO BUILD A MILL.—Angels Record, March 20: The Matson mine, adjoining the Gold Cliff, was sold last week to Messrs. A. J. Lane & Co. of Knight's Ferry, who intend to build a ten-stamp mill in the near future. A competent millman will have charge of the property. There can be no doubt that the mine is all that has been claimed for it.

## El Dorado.

HENRY'S DIGGINGS.—Cor. Placerville Democrat, March 24: Since my last letter I have been looking over the mining camps in this part of El Dorado county, both gravel and quartz, and find them looking well. All the mines in this locality are at work, and all seem to feel well. The Parker Bros. will soon have a 10-stamp mill running. Wm. Griff and Lefe Missamore are mining on the trail leading from this place to Grizzly Flat, and are getting much gold. Wiley Sexton & Co. are taking out some fine-looking gravel at Dogtown. Wiley also has a claim near Grizzly Flat. I understand the El Dorado Quartz Mining Co., near this place, have shut down the mine and mill for repairs. S. P. Poskin of Grizzly Flat, and John McDain of Henry's Diggings, have some fine-looking gold-bearing quartz in their tunnel. Good gravel is being taken out of the Carrie Hale mine, and the Bradley ditch is full of water.

VIRGINIA.—Placerville Observer, March 20: At the Virginia mine on Poverty Point, a tunnel has been run on the vein 100 feet. The ledge averages about 4 feet wide of free-milling ore that prospects from \$12 to \$15 per ton. This ledge is well defined between two smooth walls, soft and easily mined, seldom requiring powder. The outlook of this mine is decidedly encouraging to the owner.

CHURCH.—Hon. J. H. Neff of Placer county, ex-Governor Perkins and others, own the Church mine near El Dorado. They have a shaft down 260 feet showing a ledge 12 feet wide of ore, which pays in free gold over \$18 per ton. The ore chute seems to increase gradually in width from the top down. Six miners take out sufficient ore to keep their ten-stamp mill running day and night. That the Church is one of the best bullion-producers in the county is an established fact. The company are now preparing to lay a line of pipe 2000 feet in length, from the Park canal to their mill and hoisting works, so as to run their entire machinery by water-power.

EQUATOR.—The Equator mine, about 2600 feet north of the Church mine, near El Dorado, is running a tunnel to crosscut the same ledge several hundred feet deep, and from surface indications and other surroundings it is scarcely to be doubted that the company will open up a mine perhaps equal to the Springfield and Church at the same depth.

TRUE.—The True Co., north of Placerville, tapped the same ledge with their 1300-foot tunnel, which they have been running for a long time, and, though they have not got through the ledge so as to establish its entire width, the outlook is exceedingly gratifying to the owners.

BIG TUNNEL.—Still further north the Big Tunnel Co. are driving ahead as rapidly as possible, and must in time crosscut this same ledge at a great depth from the surface, which will give them important advantages for economical working.

CONFIDENCE.—The Confidence Placer Mining Co. at the head of Cedar, are running two tunnels from the bottom of their incline, one east and the other south. The east drift is in 200 feet, in 2½

feet of gravel, the south drift being in 50 feet in 4 feet of very fine pay gravel. In running these drain levels, they take more than enough gold out to pay all expenses.

## Lake.

QUICKSILVER.—Lower Lake Bulletin, March 24: Under the efficient superintendency of Capt. White, new and valuable developments have been made at Sulphur Bank Q. M.

## Mariposa.

MARIPOSA GRANT.—Gazette, March 24: We have nothing new to state authoritatively in regard to the movements of the Mariposa Commercial and Mining Co., owners of the Mariposa Grant. What they intend to do will be best known when they get into the field and commence active operations. There seems to be a general opinion among the settlers and those waiting for work that no extensive work will be done in the mines this season. A water ditch or canal is, no doubt, the first thing to be considered. With water-power a great deal can be accomplished for private as well as public good.

## Monterey.

BURRO DISTRICT.—Cor. San Luis Obispo Tribune, March 24: The Burro mining district is coming to the front as never before and this time is likely to stay. The Cruikshank mill is crushing a ton and a half of ore per day, and claims to be grinding out \$500 per day. The Manchester is in luck; also the Ajax, which has capital to develop; this also claims great things. The Eureka and other lesser lights are showing up to good advantage, so that there may be said to be a live boom on hand. These mines it is known belong to resident citizens and will doubtless prove a benefit to the State at large.

## Nevada.

THE PITTSBURG MINE.—Transcript, March 24: It is announced that the Pittsburg Mining Co. are about to commence working their mine in this district on a more extensive scale than they have for some time past. The Pittsburg has produced a great deal of gold in years gone by, and is believed to yet contain much. One thing and another has, however, interrupted its operation of late, but now that it is provided with efficient machinery, good arrangements for drainage, etc., it is quite likely there will be no further obstacles to the working of the claim.

OMAHA MINE.—Grass Valley Union, March 25: The water in the Omaha mine has all been pumped out for some days, the lowest level drained being No. 9. A 10-inch pump is being put in down to that level from No. 4 level, and above No. 4 to the surface a 12-inch pump is used. These pumps will be sufficient to control all the water in the Omaha and Lone Jack. The depth of the Lone Jack shaft is not definitely known (so many years having passed since work was done upon it), but from the best information obtainable it is about 500 feet. The mine has good ore in it, and the record of its yield during its former productive period has been written at \$500,000. By consolidating the Omaha and Lone Jack the owners have done a very sensible thing.

THE PENNSYLVANIA.—Tidings, March 26: The rich rock reported from this mine of late has been taken from the second level north, while in the meantime level No. 3 north has been driven ahead. Yesterday the vein was encountered in this lower level and it varies from 18 to 26 inches in thickness. Although none of the ledge here has been taken up, pieces chipped from it show gold and other mineral freely. An assessment of 1½ cents per share of capital stock has been rescinded, recent developments and this last strike justifying such procedure. There are 40 or 50 tons of ore on the dump, and hauling to the mill will commence this week. Capt. Hamill & Co., lessees of the mine, say they would not take \$5000 for this batch of rock.

WASHINGTON TOWNSHIP.—Cor. Nevada Transcript, March 25: Times are looking favorable in this district. The mines are all doing well, the Blue Bell showing up nicely. The Yuba mine is running in full blast and looking better than ever. The Daylight will soon be in running order. The Washington at Ormonde is running at full blast. The Rough and Ready gravel mine near Washington, shut down last Tuesday on account of a reduction in wages. The owners are fearful lest the hoisting works will be blown up with dynamite. Mr. Nixon's mine on Brandy Flat is looking well. The California, on Gaston ridge, is under headway. It is rumored that the Gambrian mine will start by the first of the month. The Baltic tunnel is said to be nearly to the ledge. The Cary mine will start by the first of April.

## Placer.

MAY FLOWER.—Placer Republican, March 21: The May Flower tunnel, a mile long, the incline, and the upraise have all been completed, and the miners broke through into the long-sought blue gravel last Friday. Blue gravel of the same character as that in the old works above was found. The point at which they have cut through the bedrock into the channel is somewhat high on the rim, but it will be the work of only a few days to push the tunnel ahead and cut the bedrock lower down. The survey and the work have proved to be a success. There is a large force of men at work and the mill and mine will soon be in operation. At the Live Oak they have just found the north rim of the new channel, and have ascertained that the channel is about 200 feet wide with 7 feet of gravel. They will begin breasting this week and wash the gravel which does not need crushing. The gravel from a new drift running easterly must be run through the mill. Everything appears to be booming at the Forest Hill mines.

## San Joaquin.

INDICATIONS OF OIL IN LODI.—Stockton Independent, March 26: One day last week while a force of men were boring for water on Miner Burge's lot in Lodi they struck a flow of water containing abundant indications of oil. These indications were found at a depth of 95 feet, after passing through fine strata of bardpan.

## Sheets.

IGO.—Cor. Shasta Courier, March 24: There has been some stir in mining circles of late. The Shane Bros., of Sonoma, have had placed at the Continental mine at South Fork one of their concentrators, which works well and gives satisfaction to the owners thereof. Eogle & Godfrey have been taking ore from the Dayton mine getting it concentrated here and shipping the concentrations be-

low. Robinson & Son are taking out ore from the Bullion mine. The Hardscrabble mine has just cleaned up, with satisfactory results.

FRENCH GULCH.—Cor. Redding Free Press, March 24: Geo. Kline has been over to French Gulch to look at Frank Wheeler's new discovery, and pronounces it the richest in Shasta county. There is ore enough in sight to run their new five-stamp mill for five years. The vein can be traced on the surface for 600 feet, at an average width of four feet, and it is free of sulphurets. It is high-grade ore. What astonished him most was how anything so rich could have lain hid so long. Steps are cut in the hill for a mile to reach it, as it was almost inaccessible without them. L. Gross, a mining agent, has purchased several claims on Squaw creek, and busy times may be expected soon.

## Trinity.

THE HARDCRABBLE.—Trinity Journal, March 24: Mr. W. R. Bigelow has sold to A. J. Wallace his one-fourth interest in the Hardscrabble mine at East Fork. The mine is looking very well and the company have let a contract to sink an inclined shaft 30 feet, following the ledge; this will bring them to a depth of 100 feet, and it is probable that the mine will be much increased in value by the completion of this work.

## Tulare.

NEW COMPANY.—Visalia Delta, March 22: The Mill Creek Mining and Milling Co. has been incorporated, with principal business place at Visalia. The gentlemen's names appended to the articles of incorporation are A. E. Hall, J. E. Denney and W. W. Stouland of Visalia, and Phares W. Rider of Dunlap, Fresno county. The present base of operations is confined to Mill creek, at a point about 30 miles north of Visalia. Prospecting has been carried on here for about a year, with very encouraging results. A tunnel has been run 100 feet, and ore taken which assays from \$35 to \$75 per ton. The company will erect a 5 or 10-stamp mill within a very short time, and thenceforth make vigorous efforts to develop the mine, which is believed to be very rich.

## Tuolumne.

MOFFITT'S BRIDGE.—Union Democrat, March 24: The marvelous yields of Mr. Moffitt's river claim last fall are yet fresh in the minds of Tuolumne people, and meeting Mr. J. R. Moffitt in Sonora this week we learned that he is now making extensive and systematic arrangements for the early and prolonged prosecution of the enterprise. His army of men will force the work with expedition and experience, and next summer and fall prodigious results will be obtained.

CHLORINATION WORKS.—Union Democrat, March 24: The mining and milling community of this county has for a long time desired the erection and conduct of chlorination works, and in the absence thereof large quantities of ore have been shipped to San Francisco to the various metallurgical works, thereby creating considerable expense. In the near future, however, the miners of this and adjoining counties can have their ores treated thoroughly and scientifically by the most modern and approved system of chlorination. Mr. P. J. Sullivan, of the Buchanan company, is now in Sonora, and in an interview with him we learned that he is making expeditious and strenuous efforts to have chlorination works erected at the Buchanan mine and in operation within at least 60 days. The works will have a capacity of four tons per day, and besides desulphurizing the concentrations of the Buchanan mine, the works are intended also for custom service. All of the appointments of the institution will be of the best.

NOTES.—Union Democrat, March 23: The McPherson mine, not far from Columbia and next to the Stanislaus river, is, we learn, doing well. Tommy Gibbons hauled four miners up to the Clark mine this week. Both the mill and mine are in operation. We learn that the Hyde mine is widening out and is looking well; it averages in width about 10 feet. Mr. C. J. Garland, a mining gentleman of much experience and ability, is superintending the Oneste mine at Groveland. Tuttle town is coming to the front. Within less than 500 yards of each other, three quartz-mills are in constant operation. It is rumored that a good-sized pocket was taken out this week at or near Tuttle town, but thus far it has not been verified. The Oakland mill, situated on the Yankee hill ridge, not far from Nate Arnold's mine, is, we understand, about to be started on rock from the mine of the same name. The parties having the enterprise in hand are Messrs. Bryant, Booth and Hastings. Mr. Miller of the Kincaid gravel mine came up from Stockton this week. It is expected that the mine will make a fine record for itself this summer and fall. Every facility for working is now brought into requisition, and the weather no longer impedes operations. Messrs. Paul Morf and Eugene Abbott are the owners of the Great Western mine, and from some prospects which we have seen the rock will certainly pay well. The mine is about 12 miles east of Sonora and not far from the Evans mines. It is reported that a mill will be erected on the Dead Horse mine, near Summer-ville, in a short time. From all the evidences thus far, this is a valuable property and much is expected from it. The Lady Washington mine, on the same lode, and owned by Mrs. Dorsey of Sonora, is also a fine property. It is learned on good authority that the Black Oak mine near Soulsburyville is developing into a splendid property, and thus from present indications both as to the value and quantity of the ore, the mine will rival and probably surpass the famous Soulsby mine, which years ago yielded millions of dollars. The lode at present is eight feet in width and will pay \$40 per ton.

GOLD.—Tuolumne Independent, March 24: Messrs. Engstrom and Hastings, lessees of the claim of McKenna, Hastings & Hale, near Columbia, are still taking out gold. One day last week they opened a little watch-pocket containing \$270.

## NEVADA.

## Washoe District.

BULLION.—Virginia Enterprise, March 24: Are still at work on the station over the winze on the 500 level to put a steam hoist at that point. The plant is expected here daily.

CONFIDENCE AND CHALLENGE.—The Challenge mine occupies 50 feet of ground north of the Confidence and 40 feet south of it. Ore was struck a

few weeks ago in a drift in Confidence from the 1100 of Yellow Jacket. But very little information has hitherto been published regarding the work done to develop it. The following description is the best information attainable by this reporter regarding it: An upraise incline at an angle of about 35 degrees was started near the north lode of Confidence and run south toward the Jacket, and a drift from the Jacket 1000 level was started north toward the south line of Challenge to meet it. This upraise has been continued until it is now in the neighborhood of the Challenge and has a distance of about 150 feet. It has run in ore all the way. This ore is understood to be above the milling grade. The ore body narrows and enlarges at different places, but gets stronger as the Challenge south ground is approached. It will undoubtedly be found in this 40 feet of ground stronger than at any other point, and will also be found in the Jacket on the 1000 level where the north drift is making. In the north portion of the Challenge ground a winze was sunk from the 1100 some distance north of the place where the Confidence incline upraise starts for the south on the 1100, and the bottom is in good ore. The above figures then show an ore body which can scarcely be less than 300 feet long, and to which is given an average width of 25 or 30 feet. Are shipping about 120 tons of above average grade milling ore from the Confidence to the Brunswick mill per day.

SAVAGE.—On the 400 level the south drift has been advanced 24 feet. In the north drift we are putting in sill sets preparatory to extracting ore. On the 500 level we are opening a new working station from the shaft, which will be completed this week. We are extracting ore from the several levels between the 400 and 900 stations. Through the want of milling facilities we have not been able to make our usual shipments. We are now shipping and having reduced at the Rock Point mill, Carson river, about 60 tons per day, and expect to have milling capacity for double that quantity very soon.

GOULD AND CURRY.—On the 250 and 300 levels have extracted during the week 75 tons of fair-grade milling ore, which has been stored in the drifts in the mine. On the drain tunnel the main south drift has been advanced 102 feet. West crosscut No. 1 from the main south drift has been extended 31 feet; total length, 90 feet. It is passing through low-grade ore. West crosscut No. 2 has been extended 22 feet; total length, 70 feet. It has been connected with the south slope from the 250 level and is in low-grade ore.

CROWN POINT.—The 400 level winze started last week was down 41 feet yesterday morning in ore of good grade all the way, and the ore at the bottom is of the same character. At a distance of 40 feet down the winze the west casing or west lay was struck. It is pitching southeast 50 degrees, and the course is southwest and northeast. Are still following on this wall in ore.

HALE AND NORCROSS.—From the south drift, 400 level, we are stopping ore of good quality. On the 700 level all the slopes are looking well. From these two levels we are extracting and shipping to the Mexican and Nevada mills 200 tons per day. The battery samples average \$38 per ton. We have bullion on hand and previously shipped for this month amounting to \$75,000.

BEST AND BELCHER.—East crosscut No. 4 from the main north lateral drift has been extended 30 feet; total, 75. The formation is quartz, showing low assay value. The upraise has been carried up 20 feet; total high above track floor, 120 feet. From the top of this upraise a north drift has been advanced 34 feet. This drift is wholly in quartz, showing value by assay.

BALTIMORE.—Are cutting into the vein at two different points, one in the north drift and another in the northwest drift. Both are in ore. Water was struck at both points, but they have managed to keep it back. Drill holes have been sent from the northwest drift and it is taking the water of both drifts.

BELCHER.—The east crosscut on the 500 level is now in 170 feet. The ground shows no change. The west crosscut has been advanced 12 feet; total, 72 feet. Have resumed work on the south lateral drift, which was advanced 8 feet. The face is in favorable-looking vein material.

ANDES.—The drift on the 350 level, which has been running east, has been turned northerly. The face is in good ore, and the prospect is flattering. It is expected to connect this drift with another at that point. On the 240 level are drifting north in a favorable formation.

IOWA.—The McBee tunnel has been repaired and the track laid 15 feet. Advanced face of same 6 feet; total, 800. The face is looking well, with quartz seams coming in. The Chandler cut was advanced 8 feet, showing good quartz.

OCCIDENTAL.—In the lower tunnel, 150 feet south of the north incline winze, the south drift has been extended 7 feet; total, 38. Have extracted 30 tons of fair-grade milling ore.

CHOLLAR.—The south drift from below the Hale & Norcross 400 level is in 160 feet in Chollar ground. It lacks 160 feet of connecting with the Chollar 600 level drift.

UTAH.—On the 472 level the incline upraise from the end of east crosscut No. 3 has been carried up 40 feet; total high on the upraise, 88 feet.

YELLOW JACKET.—Are shipping 100 tons of gold-bearing ore daily to the Santiago mill, which has been properly repaired.

JUSTICE.—Work has been temporarily discontinued in this mine. There are about 1700 tons of milling ore on the dump.

ALTA.—Are upraising in Lady Washington and sinking on the Keystone vein to meet the upraise from the 725 level.

SCORPION.—On the 300 level the north drift is advanced 152 feet and the south drift 133 feet.

POTOSI.—The west drift (Belvidere) is in 85 feet. This drift is showing fine-looking quartz.

## Aurora District.

ANTELOPE MINE.—Esmeralda News, March 20: Since the return of Hon. H. Marden to Aurora, a contract has been let to drive the Porter tunnel 200 feet under the old workings of the Antelope mine. The work has been commenced and will be prosecuted expeditiously. When it is in it is supposed that the tunnel will tap the ledge at a greater depth,



and an increase of miners will be put to work running levels on the vein and extracting ore to be worked at the Silver Hill mill, which has been consolidated with the Antelope property. The prospect is therefore good for Aurora.

**Eureka District.**

**ORE.**—Eureka *Sentinel*, March 24: The Richmond Company received 14 tons of custom ore this week, viz.: From the Jackson mine, seven tons; Barton, six tons, and White Pine, one ton. There will not be much increase in the purchase of side ores at our furnaces until the roads are in condition for hauling.

**DIVIDENDS.**—The Eureka Con. Mining Co. declared another dividend last Tuesday of 25 cents per share, amounting to \$12,500. The total amount of dividends paid by this company, this one included, amounts to \$4,803,500. It is probable that the Richmond reduction works will resume operations on the 1st of April. The tributaries in the Eureka tunnel have out, ready to ship, between 40 and 50 tons of ore.

**Frieberg District.**

**SMELTERS WANTED.**—Eureka *Sentinel*, March 24: John Ernest has been working lately on a mine in the Frieberg district, owned by George Ernest, Joe Williams and himself. He has taken out a ton and a half of ore that will assay about \$700 per ton. This he has taken to Salt Lake City, where he will try to enlist capital to put up smelters in the Frieberg district. It is believed that there is sufficient high-grade ore, when smelted with the low grade, to pay profitably.

**Gillie District.**

**SMELTING WORKS.**—It is stated that a New York corporation is making all necessary arrangements for the construction of a furnace at or near Luning. This is a want which if supplied will bring to the front many of our mines that have long been noted for their unbounded quantity of copper and other base ores. With a suitable furnace at that place, Gillis mining district will be the scene of activity. It has always been understood that on each side of Luning there are mines of fabulous wealth—property which, with half careful management, would furnish employment to hundreds of men and be a profitable investment. The ledges are immense, and the ore of a grade which if worked at home would pay handsomely. In addition to the copper and other base metal mines of that section, there are numerous silver mines, each carrying a percentage of gold which could be mixed with the lead ore and thus be in shape for the smelter. Should the contemplated smelting works be erected by this New York syndicate it will be but a matter of a short time when others will be constructed at Hawthorne and vicinity to reduce the ores of Hawthorne district.

**Jefferson District.**

**A FEW STILL THERE.**—Belmont *Courier*, March 17: The only parties at present working in the mines of this once famous district are Charles Kanroha, the Nelson Bros., E. Frank Corriolo, the Harrison Bros. and James Bryson. They are all taking out ore of a good grade. Kanroha will start up his mill as soon as the weather will permit, so also will the Harrison Bros. They expect to make a profitable run this summer. At one time Jefferson was a camp of considerable importance and its mines producers of silver bullion in large quantities, and one of them—the Jefferson—paid dividends, but the owners deeming it wiser to operate them for stock deals, coyoted near the surface with the ledges, uncovering a small body of rich ore whenever they wanted their stock to rise. When it reached their figure they would unload and then levy an assessment, and as it dropped in price gather it in again. Successive deals of this character disgusted the public. Were the mines of Jefferson properly treated it would be a rich and populous camp; bad management, however, has given it a setback that has not yet been overcome. We think that the day is not far distant when Jefferson's mines will be operated by parties who will make them yield their wealth.

**Northumberland District.**

**LOOKING BETTER.**—Belmont *Courier*, March 17: From Mr. Brewer we learn that the Grant mine in Northumberland district, Nye county, owned by Adams, Brewer & Co., is looking better and better as the work of development is advanced. The face of the tunnel is all in ore and the prospect for uncovering a large body of it is excellent. Assays from samples of the late strike range all the way from \$50 to \$150 per ton. It is the intention of the owners to push the work in the mine with energy.

**Pioche District.**

**NEW COMPANY.**—Salt Lake *Tribune*, March 25: There are big things in store for Pioche. A new company is going in there and a deal is now pending which means a rejuvenation of the camp. But the preliminaries are not yet complete, so the parties concerned are lying low and propose going gunning for the first newspaper man who gives the snap away.

**Revelle District.**

**PAY ORE.**—Eureka *Sentinel*, March 24: John Norris has struck a body of good pay ore at Revelle, sufficient it is said to start up a mill this spring.

**Secret Canyon District.**

**WATER JACKET.**—Eureka *Sentinel*, March 24: "Doc" Hamilton is getting some rich ore from the Water Jacket mine in Page canyon.

**Tybo District.**

**BETTER ORE.**—Eureka *Sentinel*, March 24: The Dimmick mine we learn is looking better than ever, and the ore is richer as depth is attained.

**ARIZONA.**

**AURIFEROUS CLAY.**—Phoenix *Arizonian*, March 20: D. E. Keating of Providence, Rhode Island, and R. J. Kerr of Tucson, arrived in Phoenix last evening. The gentlemen are interested in a mining project that is likely to greatly advance the interests of Phoenix. The enterprise comprehends the working of a large deposit—several hundred acres in extent—of auriferous clay, near the mouth of Humboldt creek. Their placer ground is on the southern edge of Yavapai county, and but a few miles north of the Maricopa county line, and has long been known for its vast richness. Heretofore, for the lack of sufficient means, it has been impossible to work

the grounds, but it is now proposed to dam the creek, provide a reservoir, and with the water thus stored, to work the mines by the hydraulic process. Considerable machinery for the proposed enterprise has already been received at the depot here, and it is the purpose of Messrs. Keating & Kerr to immediately perfect all arrangements for the thorough working of the mine. Phoenix will benefit greatly from the trade which the new mining camp will create.

**VARIOUS MINING CAMPS.**—Prescott *Journal-Miner*, March 22: F. R. Raymond says his Kirkland valley mining claim is opening up well. John S. Jones brought in a \$2000 bar of gold from the Standard mill to-day. Two wagons with 8 tons of ore from the Congress mine arrived at the sampling works to-day. E. E. Wann, superintendent of the Eta mine, sent out 4 teams to-day loaded with supplies for his camp. Mr. Prout, in charge of Copper Basin mines, is well pleased with the showing made in the development of that property. A. J. Rupert and sons continue to run their Huntington battery on rich ore from their Groom creek mines. The shaft of the Congress mine has passed the 200-foot level, the ore body continuing. There is at present a force of 25 men employed. An \$1876 bar of gold was brought in from the Lynx creek hydraulics, as a result of a partial cleanup in some side boxes, of less than 20 days' run. Robert Atkinson, in the experimental run recently made with an arastra on a ton of ore, carefully weighed, from his Spruce canyon mine, cleaned up \$82 in gold. John Owens, better known as "Chloride Jack," the discoverer of the McCracken mine, in Mohave county, in 1874, is in Prescott. He says he has recently located a mine in the Santa Maria district which is better than the McCracken. The *Herald* announces that a 7000-pound portable boiler passed through Phenix en route for the golden mesas of Humboldt creek, where extensive hydraulic operations are about to be inaugurated. The district is in Yavapai county. E. E. Wann, superintendent of the Eta mine, has about 30 men engaged building a road from the mine to the mill, a distance of 6 miles. He has closed work temporarily in the mine. He expects to be able to start the mill in about 60 days. Twenty-four men are now employed in the United Verde copper mines at Jerome, and the force is being increased daily, as room can be made, to work them successfully. It is expected that during the year there will be from 300 to 400 men employed in the camp. Alex. Harris left to-day with a load of supplies for the Gold Wire mine in Malpais district, near Squaw peak. This mine is owned by Mr. Harris and the McKesson brothers, and work will be resumed at once on the property, and an arastra started to work the ore. The property is rich in gold.

**MONARCH GROUP.**—Arizona *Enterprise*, March 24: The Monarch groups of mines, located in the Casa Grande district, now being developed by Kansas City capitalists, show a really remarkable development, much better than the most sanguine of its friends hoped for. They now have a tunnel in 725 feet. Without any further developments this company has sufficient ore in sight to run a 20-stamp mill several years, and their intention is to erect such a mill at once. The opening of this mammoth property will be the means of directing attention to this really deserving district, one that offers more and better opportunities for the employment of capital in a legitimate way than any that can be named. Just east adjoining the Monarch group is what is known as the Silver World group, owned by residents of this county. Limited in means, their developments have been limited, yet sufficient has been done to demonstrate that this property will take rank with the Monarch and other large properties of which this district is destined to produce several in the near future.

**COLORADO.**

**SAN JUAN MINES.**—Silverton *Miner*, March 23: The Greco Mountain strike is holding out splendidly. The Bear mine has 400 tons of ore out ready for shipment. The North Star on Solomon has over 400 tons of high-grade ore sacked for shipment. Only 40 feet yet remain to be run in the great North Star crosscut on Sultan mountain. It is now in over 2000 feet, and another month will show to the world what San Juan county can do in the way of deep mining. Mr. Harlow has started work on the Star of the West. The trail has been dug out and provisions to last until May 1st have been taken up. A tunnel 30 feet long through the snow was run in order to reach the cabin door. The Bear mine resembles a quarry. It is actually the largest body of ore in the county without a single exception. This immense ore body runs from 4 to 12 ozs. gold and from 20 to 40 ozs. in silver to each and every ton. The Titusville is part of this vein. The mine is at present being worked under lease. The Monster is a gold property that has become very prominent during the past year by reason of its large and uniformly rich veins of quartz, and bids fair in the near future to eclipse the celebrated Sampson in its palmy days. Mr. Fisher has in contemplation the erection of a stamp-mill for the treatment of his quartz, and the other extensive operations promised warrant the prediction that Gladstone will come in for quite a boom this season. Everybody in San Juan will be glad to learn that Otto Mears has struck it richer than ever in the Buckeye. For the last 40 feet the men have been in big pay, and a month ago Otto remarked that if the ore held its own for 40 feet a half million dollars would not buy the mine. It has not only held its own, but is improving constantly, and yesterday he received notice that there was 2½ feet of solid gray copper in the breast, and over 100 tons on the dump. This strike sends the Buckeye to the head of the list.

**GEORGETOWN NOTES.**—*Courier*, March 20: The Pelican-Dives is working 30 men. Work has been resumed on the Maple Leaf lode, Fall River. Ore of an excellent grade is coming from the 150-foot level on the Centennial. The entire Jo Reynolds and Red Elephant product will be sent to Georgetown. A good body of ore is said to have been struck by the Favorite Co. at Dumont. Several runs of high-grade ore were made from the Equator last week. First-class ore from 600 ounces. Some of the heavy lead ore from the Lucy returns over 600 ozs. in silver to the ton, and a cubic foot of the ore will weigh over 500 pounds. Several of the Centennial people will probably be here this week to definitely determine the course to be pursued in working their

mine—whether it shall be done by days' pay, contract, or under leases. A foot of as fine ore as ever came out of the Colorado Central was struck last week. It is chock full of gray copper and ruby silver, and if it holds out as the ore bodies in the levels above held out, there's a bonanza to be extracted the coming year. The crosscut to the Lucy mine has reached the vein. A contract will be let to drive a drift some 300 feet to the ore chimney exposed in the upper adit. It is highly probable, however, that a good body of ore will be struck almost any day, as the gangue is impregnated with blotches of what appears to be very rich mineral.

**DAKOTA.**

**SILVER CITY.**—Deadwood *Pioneer*, March 20: Dave Short, in from the Silver City, yesterday, states the shaft has now reached a depth of 65 feet. Himself and another are at work sinking for greater depth as rapidly as they can. The bottom of the shaft is in good ore, first encountered when a depth of not more than ten feet had been attained. Developments will be pushed continuously during the summer. The mine is situated in Bald mountain district. The ground is owned by individuals, who until date have refused to transfer their interests to a corporation. All reports from the Oxford concur that only most encouraging results are continuing to be met. In the language of a well-known miner in position to know wherof he speaks, "the body of lead ore is strengthening with every shift worked." Within a few days work will be resumed at the Prior, Bald mountain. One of Major R. L. Hopkins' centrifugal amalgamators is expected by express to-day. It will be placed on trial at the Golden Star mill, Lead.

**IDAHO.**

**ORE SHIPMENTS.**—Bellevue *Herald*, March 20: Through the kindness of the sampler and depot officials the *Herald* gives the total ore shipments for March arranged as follows: Minnie Moore, 13 cars, 244 tons, \$22,400 value; Queen of the Hills, 13 cars, 37½ tons, \$4125 value; Red Wing, ½ car, 5 tons, \$500 value; War Dance, 1 car, 15 tons, \$1900 value; Red Elephant, 1 car, 10 tons, \$1200 value; Mayflower, 1 car, 16 tons, \$2560 value. Total, 19½ cars, 307½ tons, \$32,685 value. The *Herald* has no way of exactly calculating on the value of the ore shipped, but gives figures that can be relied on as very near the truth. For instance, the Minnie ore is given at \$100 per ton; Queen, \$110; Red Wing, \$100; Red Elephant (Deer Creek), \$120; War Dance (Deer Creek), \$120; and Mayflower (bullion) \$160. The Minnie Moore will ship three cars Monday. For February the Minnie Moore shipped 252 tons at a valuation of \$25,200, but the March shipments promise to nearly double these figures, already being about as much. The Bellevue sampler does all the sampling for the entire lower river section at present.

**STRIKE IN THE COEUR D'ALENE.**—Butte *Inter-Mountain*, March 19: The Diamond Hitch mine is located in the region between Burke and Wallace in the Coeur d'Alene country, and is owned by Lehes Bros. et al. of Wardner. Joe Powell, who is now in the city, reports that a strike of wonderfully rich ore was made in the property last week, some of it assaying as high as \$600 per ton. It is a silver-lead ore of the same character as that of the Tiger and Poorman. The find has created considerable excitement, and the value of all silver-lead properties on the South Fork has gone up on the jump in consequence. The Coeur d'Alene is a good place to own a mine just now.

**MONTANA.**

**WEST GRANITE.**—Butte *Inter-Mountain*, March 20: There is an unverified rumor upon the street to-day that Manager Pardee has made the statement that the strike they have been laboring and praying for in the West Granite for the past two years has been made at last, and that they have now got the Granite vein, and it is as rich and wide as it is in the Granite Mountain workings. This statement should of course be received with some caution, as it is only a rumor as yet, but this much is certain, that it has received sufficient credence in St. Louis to cause a movement in the stock. The news of the strike, if any has been made, has not yet reached the general public at St. Louis. If the report shall prove true that the Granite vein has been struck, Montana will turn out several new millionaires this year.

**ROCHESTER DISTRICT.**—Cor. *Inter-Mountain*, March 24: This old-time mining district, after lying dormant for a long term of years, is again looking up and bids fair to become a profitable bullion-producer. Messrs. Alward & Merk operated the old Wateksa mine on a lease during the past season and shipped at a fair profit about 200 tons of ore. This returned them net from \$30 to \$40 per ton; 90 per cent of their value in gold and the balance in silver. This mine was considered worked out years ago. A 10-stamp mill was run for a long time and the owners were so positive the property was cleaned out that the mill was dismantled and moved away. All the ore that Messrs. Alward & Merk took out last season was above the water level, and at no place are they lower than 180 feet on the ledge. It is their intention to put on an engine and pump this season and test it below the old workings.

**A NEW MILL.**—Mr. E. Mueller, formerly connected with the Tuscaraora at Argenta and the Moontana Copper Co. of Butte, located here last season and acquired a half interest with Bertini in the American lead. He has erected a 10-stamp gold-mill, with jigs and Evans tables for concentration. His mill was completed during the winter and in a few days he will start up. They have a very fair prospect to start upon. They have their ledge opened by shafts at three different points to a depth of 70, 100 and 30 feet and a showing of from 18 inches to two feet of ore in each place. This, with their prospect for custom ore, will no doubt keep their mill steadily at work. Close by the American is another property owned by the White Bros., called the Shoemaker. This mine has been worked in a small way for a good many years and the ore worked in arastras, but they have erected a small stamp-mill with a capacity of eight tons daily and a Frue vanner for concentrating. These are the principal gold showings in the district, but several very prom-

ising lead prospects I have been opened this winter and quite a number of tons of ore sacked for shipment averaging from 50 to 60 per cent lead. The leads as yet are small, but sufficient is in sight to amply repay development work. There are at least 50 men at work in the vicinity on the mines spoken of and other prospects.

**THE COMBINATION MILL.**—*Inter-Mountain*, March 23: At a meeting of the trustees of the Combination Company night before last, the principal topic of interest to the public was the starting of the mill. The mines were visited last week by Messrs. Barret, Goodale and Harper, and it was their belief that it was not advisable to start the mill for about a month yet. By that time they will have a big supply of ore on hand and certain development work will be completed—that is, the body of higher grade ore found in the shaft of the Combination will be reached by the tunnel. In addition to all this the roads will be in much better condition, so that hauling in supplies will not be so expensive.

**TWO EXCELLENT PROSPECTS.**—Butte *Miner*, March 21: The lessees of the Enterprise mine, which is located just north of Meaderville, are now working it in a practical way for all it is worth. Six men are employed, and the main shaft which is now down 115 feet will be sunk to a depth of 150, at which point a drift or crosscut will be begun. Good ore has been encountered and the gentlemen are entirely satisfied with the present outlook, and expect that in a very short time they will realize a handsome return for their labor and expenditures.

**NEW MEXICO.**

**FROM VARIOUS CAMPS.**—Western *Liberal*, March 23: The Humboldt Co. has struck a rich body of ore in the Selaroe at 80 feet. Messrs. Boucher & Buck made a trip to Gold Hill this week on mining business. Gold Hill is looking up. Several mining men of prominence are taking an interest in the developments which are going on in that camp. Col. Jack Fleming of Silver City accompanied Messrs. Hart & Phillips out to Stein's Pass and took a look at the Bachelor, with which he was more than pleased. The miners of this region now have another market for their ore. Last Monday the new International smelter at El Paso, C. C. Fitzgerald, proprietor, blew in for the first time, and on Tuesday produced its first bullion. The El Paso papers pronounce it a great success. It is now running a 40-ton furnace and has a 60-ton one on the road. Frank Baxter of Morenci made a trial shipment of ore in the El Paso smelter. The ore, 15 tons, was from the Comstock and Silver Twigg mines situated in the Silver camp. Mr. Baxter returned Saturday well pleased with his shipment, as the 15 tons netted him over \$1500.

**OREGON.**

**ALTHOUSE.**—Cor. *Rogue River Courier*, March 23: The cold weather tries the tempers of the miners of this district. Water is scarce and the snow melts but slowly, although the days are, as a rule, pleasant after the sun gets above the treetops. Few of our miners are doing much in the way of work, and there is little of interest to report. James Turnbull, one of the old-time miners of the creek, through sickness, had to sell out his claim at upper Grass Flat, and quit mining for a time, at least. The Doney Bros. of California were the purchasers.

**PROSPECTING.**—Jacksonville *Times*, March 23: Considerable prospecting is now being done in Jackson and Josephine counties. The miners of Galice creek are busy and expect to make a good showing this season. Water is falling fast in many places and quite a number of the miners are engaged in cleaning up. The mines of Wimer Bros., Dess'les & Connell, in Waldo creek, Josephine county, are being operated on a large scale. At the Sterling mine two giants are being operated day and night and much ground is being moved. Good results are promised. Good work is being done at Simmons, Ennis & Co.'s mines near Waldo, which will soon be thoroughly opened. The big ditch has gradually washed out a huge cut, which will greatly facilitate operations. The Swinden mine and the quartz-mill near Gold Hill still lie idle. It was bonded to California parties for a large sum of money, but it is said that the time has expired and no one has appeared to pay the money and take the property. M. A. Brentano of Wagner creek brought down some bullion from the Golden Spike Co.'s mines last Saturday. Much good is now being done in that district, and we may expect to see some of the best quartz ledges on the North Pacific Coast opened there. R. A. Jones and Stilly Riddle of Canyonville have purchased the tailings of the Sugar Pine ledge, Galice creek district, owned by Green Bros., and will immediately take steps to reduce them. They have been assayed, and it has been found that they contain a considerable percentage of gold. Messrs. Jones & Riddle are looking after certain ledges in Josephine county.

**UTAH.**

**GOOD COOKING COAL.**—Salt Lake *Tribune*, March 22: An excellent quality of cooking coal has been discovered at a point some 30 miles west of Price station, on the Denver & Rio Grande Western, and about 8 miles from the railroad. Several well-known Salt Lake capitalists have taken hold of the matter and propose to patent the land as early a date as possible, and develop the mines. Those who have taken hold of the matter are T. R. Jones, W. H. Remington, ex-United States Marshal Ireland, Geo. A. Lowe, Mathew H. Walker and others. They will enter the land under the coal land laws. It is understood that the D. & R. G. W. people have a determined to take hold of the matter and put the coke and coal on the markets. Some of the parties above mentioned are now having furnace tests of the coal made for the purpose of ascertaining the quality of the coal and the per cent of coke it will yield. Should it be determined that that per cent is such as will make the working of our smelters will no longer be compelled to send to McConnellville for coke to use in their furnaces, or even to send to the Elk mountains in Colorado, where a most excellent article of coke is made. The development of these mines and the result of the test being made will be looked for with interest, as the discovery of good cooking coal in this Territory would be the beginning of an important industry.

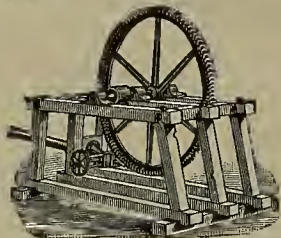
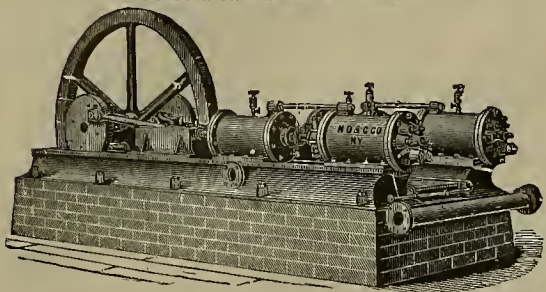


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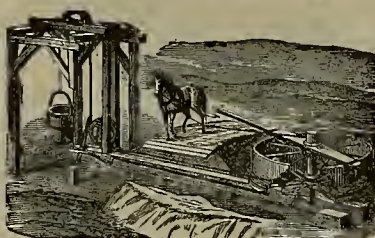
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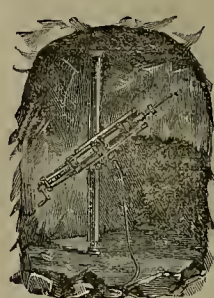


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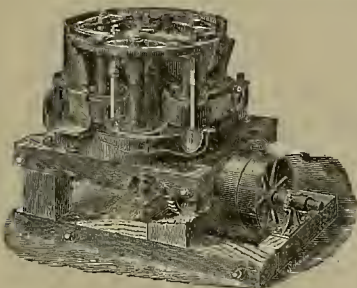


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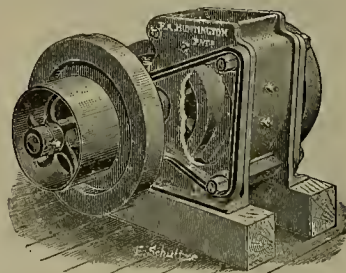
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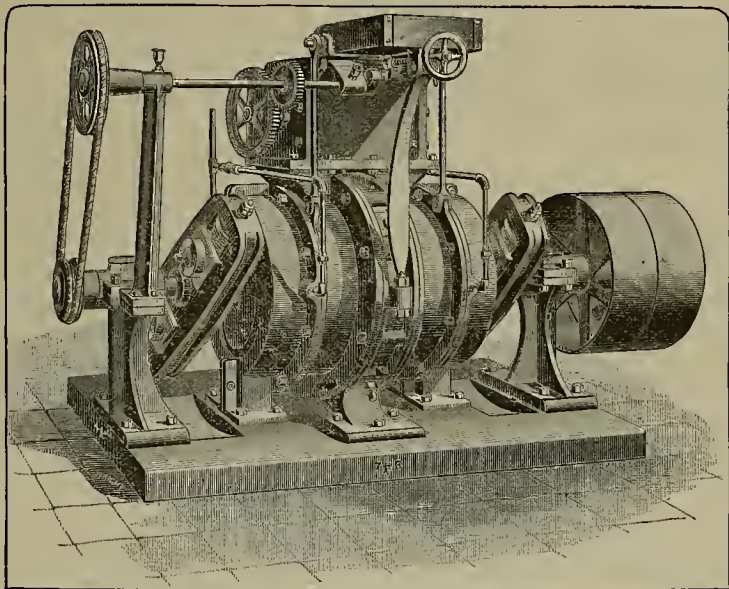
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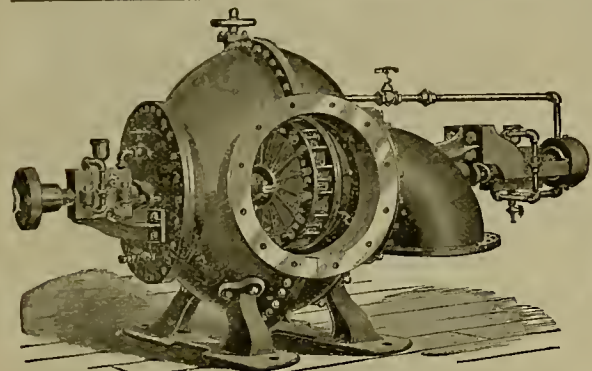
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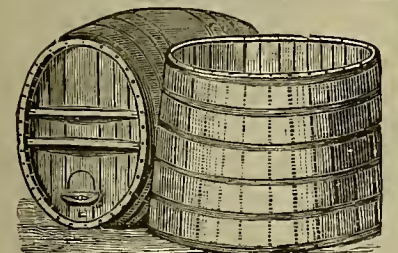
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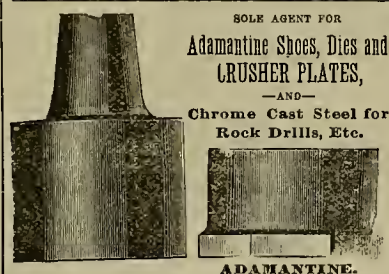
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## The Matte Process.

EDITORS PRESS:—In your last issue you print a paper written by W. L. Austin of Toston, Montana, in which the author seems to claim to be the first who, in America, successfully worked the matte process of silver smelting, at least one must conclude so from his expressions: "No American precedent" and "Vague rumors of attempts at Colorado." The general reader will be astonished that such an important process has been overlooked and praise the fortune of the country that Mr. Austin had the happy idea to find that out. Mr. Austin's brother metallurgists, however, respectfully protest against any further rediscoveries from professional men. We leave that to those colleagues who when their patent appears in court can swear that they never heard of anything like it before or after. "How," exclaims the lawyer to the attentive jury, "how can the other side claim this invention is not original when we have proven that it is the original invention of Mr. Patentee?"

This matte process has been for years the process of the Boston & Colorado Smelting Works of Blackhawk, near Central City, Colorado, one of the professionally and financially most successful metallurgical works in America, which about eight years ago removed to Denver. I visited these works in 1879 and was much impressed with the scientific management and practical arrangements. The works had the reputation of jealously hiding their secrets. These secrets, to the average mill-runner, consisted of a very sharp, active and well-informed young Englishman, not of the "practical" school of his time, as superintendent, an excellent system of sampling and assaying, a rapid discernment of this metallurgical value of each batch of custom ore and a general knowledge of "which is which" without working four weeks in the laboratory to solve the riddle.

The works have been described before, and I will only recapitulate that part of the pyritic ore was roasted to a certain percentage of sulphur and mixed with raw ore to get suitable proportions for forming matte and slag. The matte was crushed, roasted, extracted with water; the silver from the solution of sulphate of silver precipitated by copper, the copper by iron, the gold extracted from the residue of the leaching by a special smelting for matte with gold ores. This roasting was done in a "Fortschaffelungs-ofen," for which excellent German word an English translation is sorely wanted, the smelting for matte in a reverberatory. This reverberatory furnace made quite an impression upon me. When I asked to see the fireplace the whole front of the furnace rose up and disclosed a whole cord of wood stacked in the regular style of densely packed cord-wood. I did not think at that time that 10 years later the inventor of that fireplace would be classed as nothing but "a vague rumor of attempts at Colorado."

San Francisco, March 27, 1888.

## Eureka-Como.

This property has been given a notoriety of late, from the fact that a number of capitalists of the city of Stockton purchased it and are making preparations to develop it to greater depths. It is situated in Como mining district, Lyon county, Nevada, 14 miles due south of the Comstock. The formation in which the lead appears is said to be identical with the Comstock belt. The fissure at a depth of 200 feet is 190 feet in width and heavily mineralized. There are four distinct seams of quartz from 3 feet to 27 feet wide, the intervening spaces being filled with vein porphyry. Ore taken from these seams yielded \$24.50 per ton, being 65 per cent of assay value.

At and above the 200 level there is said to be a large quantity of this grade ore, which will be worked after the new owners have supplied concentrators. The Symons Bros., practical and experienced miners, with limited means, have made the present development, and have hoisting apparatus to sink several hundred feet.

Experienced miners are of the opinion that the several veins will run into a large body of ore before reaching the next 100 foot level. About 75 per cent of the yield is gold. This syndicate has incorporated with a capital stock of \$1,000,000, divided in 100,000 shares, and has already purchased additional machinery and active work will be commenced at once. The directors are Capt. J. B. Sears, C. Hurd, H. W. Cowell, R. W. Tulley and Thomas Powell. J. B. Sears is president and W. L. Baker secretary. Capt. H. S. Symons, superintendent, has had 25 years' experience on the Comstock, and has given his opinion that this mine will prove a bonanza. The stockholders are leading men of the San Joaquin valley, and will furnish ample capital to develop this property, with a view of making it a dividend-paying mine.

**THE PELTON WHEEL.**—Attention is called to the notice in another column of a change in the business of the Pelton water-wheel. The demand for these wheels had become quite beyond the capacity of the interior shop where they have been previously made, and the change will be greatly to the convenience of purchasers as regards promptness in filling orders and facility for shipment. Mr. Pelton will hereafter reside in this city and give his personal attention to the business in all its details, which insures the maintenance of the high character of this wheel in its variety of applications to mining and industrial uses.

## News in Brief.

CHIEF JUSTICE WAITE of the U. S. Supreme Court died March 23d.

SAN RAFAEL is now lighted by electricity, and a petition has been presented asking for an electric road franchise.

AN immense amount of snow fell in Wyoming Saturday. Travel was interrupted, but the stockmen consider the snowfall as highly beneficial.

THE trustees of the Lick free baths will endeavor to have the baths built as soon as possible. James Lick left \$150,000 to build these baths.

ANDERSON, Placer county, from a mining town is becoming the center of a wonderfully developed district, filled with orchards and vineyards.

THE Oregon Agricultural College building near Corvallis will be completed May 1st, accepted by the Governor and turned over to the Board of Regents.

THE gross exchanges of this country for the week ending March 24th were \$908,050,762, an increase of 5.9 per cent over the corresponding period of last year.

THE floods in Germany and Austro-Hungary, it is estimated, cover 200 square miles of territory, and alarming rumors of the extent of this damage do not cease to be circulated.

THE old British war-ship in which Mr. Darwin circumnavigated the world, and began those speculations which have revolutionized science, is now a Japanese training-ship.

SEVERAL buildings on Alcatraz island, San Francisco bay, were destroyed by fire this week. The loss is not over \$2000. None of the more valuable buildings caught fire.

STOCKTON held a mass meeting Saturday to institute measures to thoroughly advertise San Joaquin county. Irrigation, less area in wheat and small tracts devoted to fruit were urged.

THE weather-rop bulletin from Washington says: This freezing weather in the Southern States has doubtless injured small grains, fruits and vegetables in the northern portion of the Gulf States.

A BILL has been favorably reported in the U. S. Senate appropriating the following sums for Pacific Coast quarantine stations: San Diego, \$55,500; San Francisco, \$103,000; Port Townsend, \$55,000.

THE late Kaiser William left by will the greater portion of his fortunes to the Crown Treasury or General fund, and the remainder will be divided between Empress Augusta, Emperor Frederick and the Duchess of Baden.

A BILL to amend the naturalization law so as to require would-be citizens to make oath that they are not polygamists, anarchists or communists has been introduced in this House by Representative Stewart of Georgia.

THE New York Times estimates that the losses to the Government from redwood timber frauds and the operations of the surveyors' ring in California exceed those that were caused by the jobs of the Star Route conspirators.

## Mining Share Market.

While there is little to say concerning mining stocks in this city, as there is not very much interest in them, work on the Comstock mines is being very actively prosecuted. It is expected that the bullion product of the lode the coming month will be about \$750,000, of which Con. California and Virginia should contribute \$400,000. For what some people think is a "played-out" camp, this is pretty good. There would be a good "how" over this yield in newer camps. The Virginia Enterprise says the new ore strikes to report are located in Crown Point, Challenge, Chollar, Confidence and Baltimore. A few years ago a vague rumor of a change of formation in a drift, either for better or worse, was sufficient to give a healthy tone to the entire market from the Original Keystone on the north to the Dayton on the south, a distance of about six miles; but now the development of an ore body over 300 feet long by 30 or 40 wide and 100 or 200 deep, is only deemed sufficient to maintain the price of the stock at the point it attained when it had gained a mere speculative value. Strange, isn't it? But it is true. Hale & Norcross is the case in point. The ore body struck a few months ago has gone on and on in development until it has attained the above proportions, but the stock has only maintained a dreary easiness. But it is now confidently affirmed that the 220 tons daily being reduced at the Mexican and Chollar mills will soon put the mine on the dividend-paying list and start the stock upward with a bound. A heavy shipment of bullion will soon be made.

There is an important strike reported officially from Crown Point, on the 400 level, in a winze started last week. The Yellow Jacket folks have repaired the Santiago mill and are now shipping 100 tons of white rock, or gold-bearing ore, daily from their mine.

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

JOHN G. H. LAMPARDUS—S. L. Olsop & S. Barbara Co.'s.  
G. W. INGLE—Arizona Territory.  
WM. WILKINSON—Fresno Co.  
A. F. JEWETT—Tulare Co.  
C. E. WILLIAMS—Yuba and Sutter Co.'s.  
R. G. HUBBARD—Montana Territory.  
E. H. SCHAFFNER—Calaveras and Sacramento Co.'s.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

COMPANY.	LOCATION.	NO. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Andes M. Co.	Nevada.	5.	05. Feb 28. Apr 4.	27. J. M. Quay.	406 Montgomery St
Alaska M. Co.	California.	7. 10. 00.	Feb 21. Mar 26.	16. A. Judson.	329 Sansome St
Bulcher & Co.	Nevada.	34.	50. Mar 13. Apr 17.	7. J. Crockett.	327 Pine St
Bodie Con M. Co.	California.	8.	50. Feb 13. Mar 20.	26. G. W. Sessions.	309 Montgomery St
Champion M. Co.	California.	21.	10. Feb 14. Mar 19.	18. T. Wetzel.	522 Montgomery St
Crispin M. Co.	Arizona.	1.	10. Mar 7. Apr 15.	5. F. H. Leonard.	628 Montgomery St
Crocker M. Co.	Arizona.	5.	25. Feb 15. Mar 27.	1. A. Waterman.	309 Montgomery St
Calaveras Blue G. M. Co.	California.	1.	05. Feb 23. Mar 19.	9. B. Burris.	309 Montgomery St
Day M. Co.	Nevada.	16.	1.00. Feb 8. Apr 9.	7. R. R. Grayson.	327 Pine St
Eachus M. Co.	Nevada.	25.	20. Feb 7. Mar 10.	4. C. E. Elliott.	338 Montgomery St
Equitable Tunnel Co.	Utah.	33.	15. Feb 14. Mar 30.	9. C. J. Collins.	1018 Market St
Excelsior W. & M. Co.	California.	11.	3.30. Mar 20. Apr 31.	9. W. J. Stewart.	215 Sansome St
Gould & Curry M. Co.	Nevada.	58.	50. Mar 12. Apr 17.	10. A. K. Durhrow.	309 Montgomery St
Gray Eagle M. Co.	California.	6.	04. Mar 6. Apr 10.	3. T. Wetzel.	522 Montgomery St
Golden Fleece G. M. Co.	California.	12.	7.09. Jan 28. Mar 15.	10. W. J. Glendon.	310 California St
Heath M. Co.	Idaho.	3.	05. Feb 8. Mar 19.	13. W. L. Oliver.	323 Montgomery St
Keyes S. M. Co.	Nevada.	1.	20. Feb 15. Mar 20.	16. H. Deas.	309 Montgomery St
Kennedy M. Co.	California.	3.	10. Feb 20. Mar 2.	28. L. F. Reichling.	404 Montgomery St
Live Oak Drift G. M. Co.	California.	8.	04. Mar 13. Mar 20.	14. T. Wetzel.	522 Montgomery St
Livermore Oil Co.	California.	2.	05. Mar 8. Apr 9.	18. H. Deas.	309 Montgomery St
Phil Sheridan Con M. Co.	Nevada.	3.	10. Mar 7. Apr 14.	5. T. F. Holling.	533 Kearny St
Pittsburg M. Co.	California.	20.	75. Feb 14. Mar 17.	4. C. J. Baumann.	33 California St
Spring Valley G. M. Co.	California.	2.	50. Jan 11. Mar 17.	18. H. P. Chior.	320 Sansome St
S. F. Copper Co.	Nevada.	4.	40. Feb 3. Mar 3.	3. H. Finch.	320 Sansome St
Virginia Creek Hyd M. Co.	California.	5.	05. Feb 28. Apr 4.	1. J. M. Quay.	466 Montgomery St

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING DATE
Bulwer Con M. Co.	California.	L. Oshorn.	309 Montgomery St.	Annual. Apr 11
Booe Bay Coal Co.	Oregon.	W. V. Huntington.	322 Montgomery St.	Annual. Apr 11
Champion M. Co.	California.	T. Wetzel.	522 Montgomery St.	Annual. Apr 16
Germania Lead Co.	Utah.	J. M. Quay.	314 California St.	Annual. Apr 16
Live Oak Drift Gravel M. Co.	California.	T. Wetzel.	522 Montgomery St.	Annual. Apr 16
Mayflower Gravel M. Co.	California.	J. Morio.	328 Montgomery St.	Annual. Apr 16
Mount Cory M. Co.	California.	A. K. Durhrow.	310 California St.	Annual. Apr 16
Pacific Borax, Salt & Soda Co.	California.	A. H. Clough.	230 Montgomery St.	Annual. Apr 11
Phoenix M. Co.	California.	J. Boyle.	418 Jackson St.	Annual. Apr 2
South End M. Co.	California.	R. N. Van Brunt.	318 Pine St.	Annual. Apr 4
Tioga Con M. Co.	California.	G. W. Sessions.	309 Montgomery St.	Annual. Apr 9

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M. Co.	Nevada.	A. W. Haven.	309 Montgomery St.	50.	Mar 10
Eachus M. Co.	Nevada.	P. H. Leonard.	309 Pine St.	50.	Mar 10
North Belle Isle M. Co.	Nevada.	J. W. Pew.	310 Pine St.	50.	Mar 10
Oregon Coal & Navigation Co.	Oregon.	R. B. Williams.	211 Sansome St.	1.50.	Mar 2
Pacific Borax, Salt & Soda Co.	California.	A. H. Clough.	230 Montgomery St.	1.50.	Mar 10
Russell Reduction & M. Co.	California.	J. Morio.	328 Montgomery St.	05.	Sept 17
San Francisco Copper M. Co.	California.	F. B. Ford.	320 Montgomery St.	1.00.	Sept 17
Standard Con M. Co.	California.	J. W. Pew.	310 Pine St.	10.	Apr 12

## San Francisco Metal Market.

WHOLESALE. THURSDAY, Mar. 29, 1888.

ANTIMONY—French Star.	9 1/2 @ —
COPPER—	
Shelbourn.	26 @ 30
Ingot.	16 @ 18
Fire Box Sheets.	— @ 20
Iron—Glengarnock.	— @ 20
England, 60 lb.	— @ 20
American Soft, No. 1, ton.	— @ 30
Oregon Pig, ton.	21 @ 20
Clay Lane White.	— @ 20
Shots, No. 1.	— @ 20
LEAD—Pig.	5 00 @ 6 50
Shot.	6 25 @ 5 50
Sheet.	8 @ —
Shot, discount 10% on 500 bag.	Drop. 3/4 bag.
Buck, 3/4 bag.	1 80 @ —
Chilled do.	2 00 @ —
Machinery.	10 @ 15
STEEL—English, lb.	16 @ 25
Black Diamond, ordinary size.	9 @ —
Flow.	4 @ 5
Machinery.	10 @ 15
TINPLATE—Coke.	5 75 @ 6 50
On charcoal.	6 75 @ 7 25
QUICKSILVER—By the flask.	38 00 @ 40 00
Flasks, new.	1 05 @ —
Flasks, old.	85 @ —
BORAX—Harmony.	— @ 7 1/2
Powdered.	7 1/2 @ 7 1/2
Concentrated.	6 1/2 @ 7 1/2

## New York Metal Market.

Telegraphic advices dated Mar. 29th give the following New York prices:

BAR SILVER—93 1/2 per oz.

BORAX—98.00.

COPPER, LARG—\$16.00@16.60.

IRON—No. 1, \$22.00.

LEAD—\$5.00 @ —.

TIN—\$35.60 @ —.

The following is the latest by mail from the "New York Metal Exchange Market Report":

COPPER—Dull, spot closing at \$16.00@16.10. Transferable Notices (Larks) issued at \$16.30 @ —.

LEAD—Firm, at \$6.07@6.20 spot. Transferable Notices issued at \$5.00.

TIN—Quiet at \$36.50@37.00. Transferable notices issued at \$31.50@32.50.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, \$30.00@36.25; Billiton Tin, \$37.50 @ —.

Rangoon Tin, \$38.00 @ —.

Baltimore Copper, \$14.75@16.00.

Orford Copper, \$15.50@15.75.

R. S. G. Copper, @ —.

Foreign Lead, \$3.40@3.50.

Foreign Spelter, \$6.10@6.30.

Antimony, \$11.50@16.00.

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

SANTA BARBARA BITUMINOUS ROCK CO., March 25th. Capital stock, \$100,000. Directors—Joseph Scheerer, Clemons Scheerer, F. M. Frsnnd, David Fairfield, and Samuel C. Mille.

CONSOLIDATED UNION M. CO., March 25th. Location, State of Sinaloa, Mexico. Capital stock, \$1,000,000. Directors—J. Aegerter, J. F. Hoelling, A. B. Green, Isaac Blinhome and Isaac Brunbanm.

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

THE members of the Veterans' Home Association held a meeting on Saturday evening, at which W. J. Ruddick, George Walsh and W. H. Hart were chosen directors. Walsh will hold for two years and the others for one. The directors were chosen to fill vacancies.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Mar. 8.	WEEK ENDING Mar. 15.	WEEK ENDING Mar. 22.	WEEK ENDING Mar. 29.
Alpha.	2.30	2.75	3.20	3.30
Alta.	2.45	2.20	2.20	2.45
Andes.	1.35	1.70	1.60	1.35
Argenta.	1.15	20.	25.	20.
Bodie.	5.50	7.50	7.75	6.00
Best & Belcher.	5.75	6.00	6.50	6.50
Bullion.	1.70	2.25	2.30	2.50
Baltimore.	1.20	1.70	1.40	1.05
Belle Isle.	1.60	1.50	1.40	1.05
Bodie Con.	2.25	2.60	2.55	2.10
Benton.	3.05	3.94	4.25	3.75
Bodie Tunnel.	3.00	3.00	1.15	1.00
Bulwer.	75	300	115	100
Con. Cal.	15	175	100	100
Challenge.	55	125	150	125
Chollar.	55	60	6.00	6.50
Confidence.	26	52	45	50
Caledonia.	3.00	6.00	5.25	5.00
Caledonia.	5.50	7.50	8.50	8.00
Con. Pacific.	30	30	30	25
Crown Point.	6.00	7.50	7.50	6.00
Crocker.	50	50	60	70
Day M. Co.	50	50	60	70
Dudley.	50	50	60	70
East B. & E.	50	50	60	70
Eureka Con.	95	150	100	125
Excelsior.	1.20	1.35	2.00	1.95
Grand Prize.	2.00	2.05	2.00	1.90
Gould & Curry.	4.45	4.95	5.45	4.80
Hale & Norcross.	100	110	100	110
Holmes.	2.00	2.00	2.00	2.00
Independence.	60	1.00	1.15	1.25
Low.	1.00	1.00	1.15	1.25
Julia.	55	60	70	65
Justice.	1.05	1.20	1.35	1.60
Kenwick.	2.30	2.50	4.50	4.30
Lady Wash.	45	50	60	65
Marion White.	1.00	2.10	2.10	2.25
Mono.	1.30	2.10	2.10	2.25
Mexican.	55	6.50	6.00	5.75
M. D. Diable.	4.00	4.00	4.00	4.25
Northern Belle.	1.60	1.70	1.75	1.60
Nevada.	7.50	7.50	6.45	6.10
North Belle Isle.	6.00	7.50	6.45	6.10
Nias.	3.20	3.60	3.30	3.40
Nov. Queen.	3.20	3.60	3.30	3.40
North B. & O.	1.65	1.80	2.40	2.50
Ocidental.	1.10	1.10	1.10	1.10
Ophir.	1.10	1.10	1.10	1.10
Overman.	2.30	3.00	2.85	2.90
Potosi.	1.10	1.10	1.10	1.10
Perseus.	1.25	1.50	1.40	1.50
Piedmont.	50	70	60	65
P. Sheridan.	05	05	05	05
Silver Star.	60	7.50	6.75	7.00
Savage.	60	7.50	6.75	7.00
S. B. & M.	15	15	20	20
Sierra Nevada.	4.55	5.50	4.95	5.30
Silver Hill.	55	75	1.05	1.00
Silver King.	5.25	5.50	5.25	5.35
Scorpion.	80	85	1.00	1.00
Syndicate.	1.00	1.00	1.00	1.00
Union Con.	4.30	4.85	4.90	5.25
Utah.	1.85	2.20	2.25	2.45
Yellow Jacket.	8.75	9.50	115	125

## Sales at San Francisco Stock Exchange.

WEDNESDAY Mar. 29.	50	Keys.	2.10
110 Alpha.	3.25	100 Lady Wash.	550
100 Alta.	2.35	30 Mexican.	550
100 Andes.	1.80	70 Mono.	2.20
400 Baltimore.	1.05	170 Nev. Queen.	4.00



List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING MARCH 20, 1888.

- 379,758.—ELECTRIC ANNUNCIATOR—B. N. Botts, Paso Robles, Cal.  
379,676.—DRAFT ATTACHMENT FOR PLOWS—H. E. Bradbury, Banning, Cal.  
379,855.—GLOVE—F. H. Busby, S. F.  
379,856.—SHINGLE-SAWING MACHINE—W. A. Campbell, Portland, Ogn.  
379,641.—AUTOMATIC WHISTLE ATTACHMENT—M. Gage, Galt, Cal.  
379,710.—WELL-DRILLING MACHINE—W. Manson, Colton, Cal.  
379,874.—BINDING BOOKS—Meston & Dygert, Portland, Ogn.  
379,747.—SHIRRED ATTACHMENT—J. C. Welton, Ft. Bidwell, Cal.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SHINGLE-SAWING MACHINE.—Wm. A. Campbell, Portland, Oregon. No. 379,856. Dated March 20, 1888. This improvement in shingle machines consists especially in the employment of a tipping table by which the bolt from which the shingles are to be cut is alternately tipped from one side to the other, so as to give the proper taper to the shingles, a means for adjusting and regulating said table, and an automatic mechanism by which the tipping or tilting of the table is produced, together with the mechanism for adjusting, raising and lowering and centering the table, adjusting the lower steps of the saw arbor, and certain details of construction.

GLOVE.—Fred H. Busby, S. F. No. 379,855. Dated March 20, 1888. This invention consists of making the welt for the glove seams of felt, which possesses the qualifications of cheapness, durability and appearance. The welts are generally made of leather or sheepskin. In using skins the length of the strip or welt is necessarily limited to the size of the skin out of which it is cut, and it therefore becomes necessary to piece or join the welt in the glove, and no matter how neatly this may be done, it can always be seen. Again, the cut edge of the welt shows white. In using felt it can be prepared in a continuous length, and is available for being wound on spools so as to be used with facility. Again, the felt is absorbent, and in a measure takes up the deleterious acids of the tanned leather of the glove and thereby preserves the stitching. The felt welt may be made in any color to suit the glove. The felt is elastic, flexible and soft, and holds the stitches of the seam well, affording a better cushion for said seam than the ordinary skin welt.

ELECTRIC ANNUNCIATOR.—B. N. Botts, Paso Robles, San Luis Obispo Co. No. 379,758. Dated March 20, 1888. One of the "claims" to this patent is as follows: In an electric annunciator, a fixed dial and a hand moving over it, an electric motor, and connections by which it operates the hand, in combination with a disk on the hand shaft, electrically connected with the motor; fixed springs against which the periphery of the disk moves, and circuit wires from the subscribing stations to said springs whereby the motor is driven and the hand moved over the dial, the switch by which the current is diverted to cut the motor out of the circuit and arrest the hand; consisting of an insulated contact piece in the periphery of the disk, an insulated ring electrically connected therewith, and the switch-current from the ring. The call-bell in said circuit for giving notice of the arrest of the hand, and the means of checking the momentum of the hand when the motor is cut out of the circuit; consisting of the electro-magnet in the motor circuit, the pivoted armature, and the spring causing the armature to normally bear when unaffected by the magnet upon the driving connections, thus breaking them.

Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Uncle Sam (New Mexico). March 24th, \$15,000; Standard Con., 26, \$7802; North Belle Isle, 26 \$50 000; Alice, 20, \$17,464; Germania, 20, \$2064; Hanauer, 20, \$3600; Germania, 22, \$1796; Hanauer, 22, \$1775; Germania, 23, \$1554; Hanauer, 23, \$1800; Argus, 24, \$5127; Con. California and Virginia, 24, \$94,948; Hanauer, 24, \$1600; Alice, 24, \$17,464; Moulton, 24, \$20,288; Blue Bird, 24, \$15,968; Silver Bow, 24, \$16,688; Lexington, 24, \$21,264; Pollock, 24, \$8368; Germania, 25, \$1673; Hanauer, 25, \$3300; Queen of the Hills, 25, \$1350. The hanks of Salt Lake City report the receipt for the week ending March 21st, inclusive, of \$76,931.06 in ore and \$68,882.89 in bullion; a total of \$145,813.95.

THE PELTON WATER WHEEL



Gives the highest efficiency of any Wheel in the world, and is everywhere recognized as the standard for high pressure service.

UPWARDS OF 500 IN USE.

From 12 to 20 per cent better results guaranteed than can be produced from any other Wheel in the country. It is not only most economical of water, but the most simple and reliable power for Quartz Mills, Hoisting, Pumping, or any other purpose where water power can be used.

ELECTRICAL TRANSMISSION.

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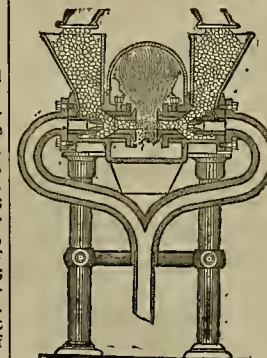
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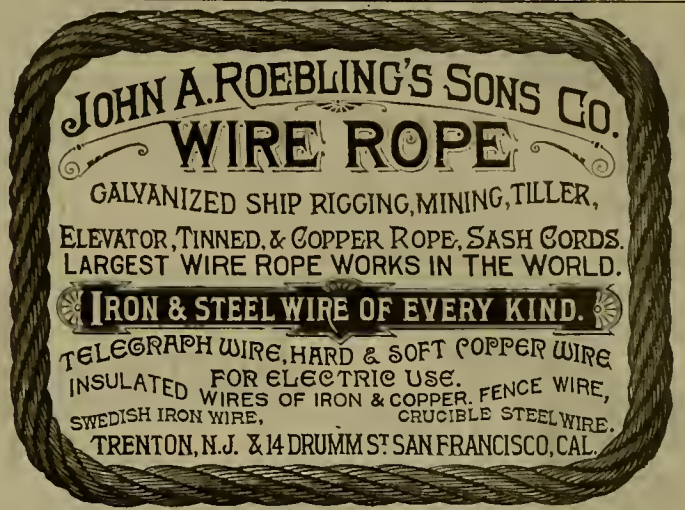
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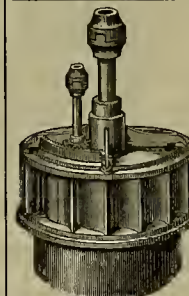
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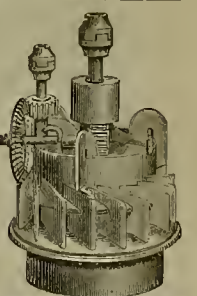
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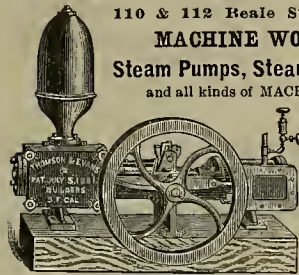
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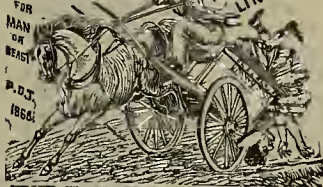
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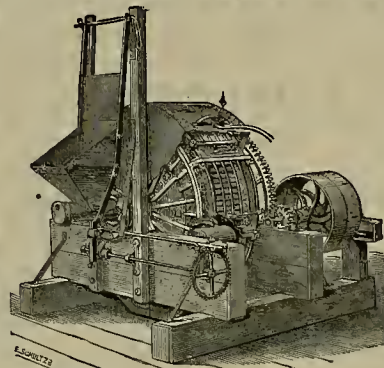
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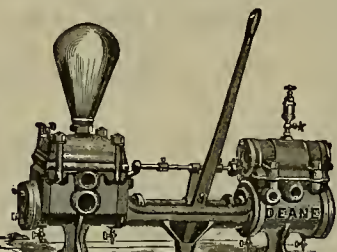
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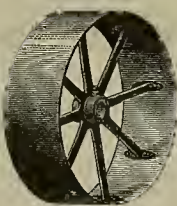
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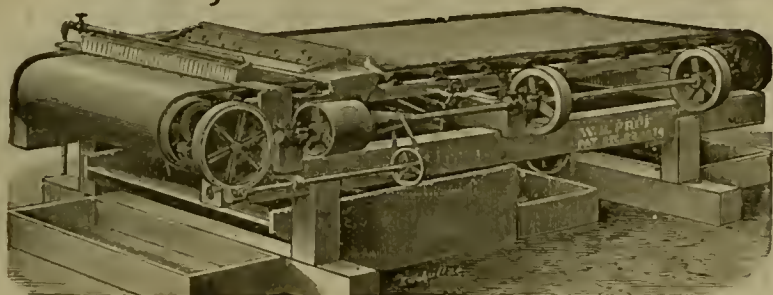
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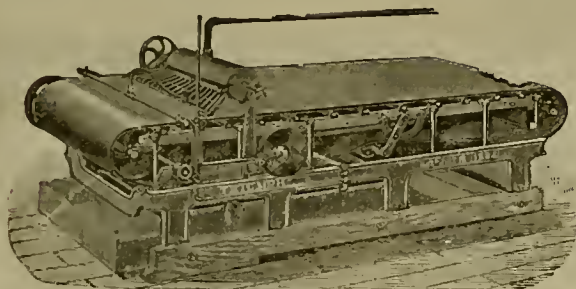
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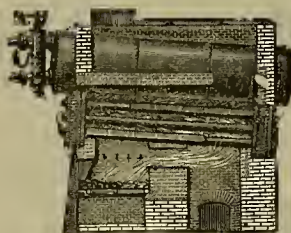
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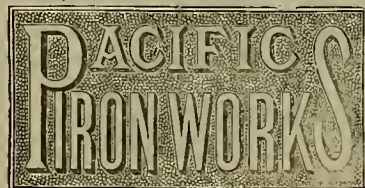
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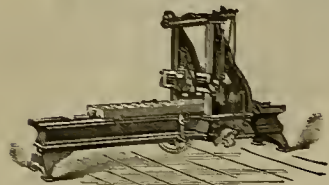
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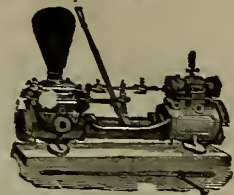
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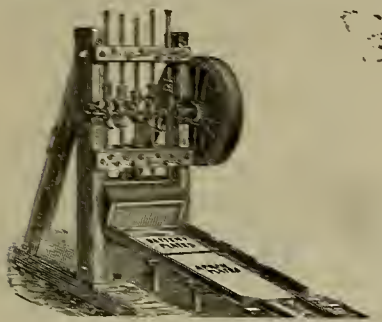
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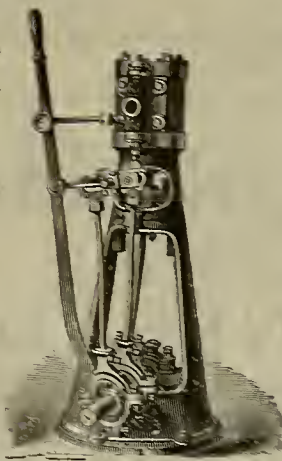
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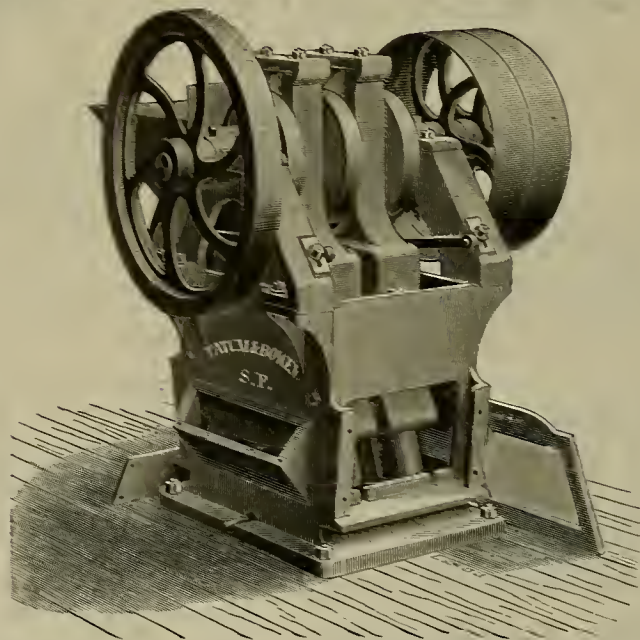
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# MINING AND SCIENTIFIC PRESS.

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VOLUME LV.  
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## Land Reclamation.

### An Immense Pumping Plant for Reclaiming Tule Islands.

In the Pearson Reclamation district, near Courtland, Sacramento county, in this State, some very extensive drainage operations have been conducted in the past few years, and they

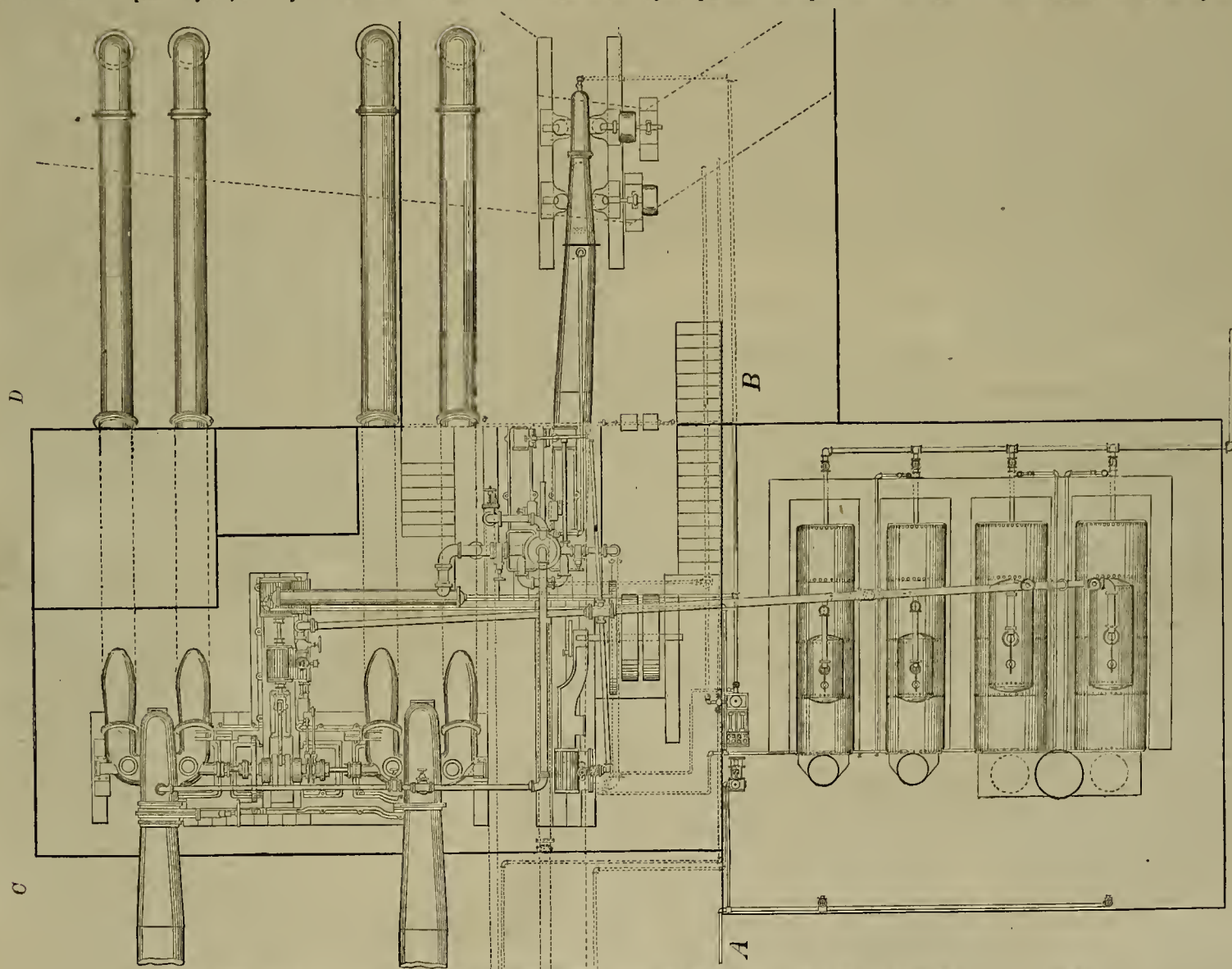
larger pumps and the same engine, three times the work was accomplished. It was exchanged for a 12-inch Turbine pump, and a 15-inch Gwynne pump was added. These were calculated to raise at least 10,000 gallons of water, with an indicated 40-horse power, against a head of 10 feet.

The results of accurate measurements made

to be driven by a compound condensing engine. The average of several tests conducted personally by Mr. P. J. Van Lohensels, the agent of the Reclamation Co., showed its capacity to be 37,907 gallons per minute at a lift of 11 feet 7 inches, the engine indicating 156-horse power, with a consumption of 4.4 pounds average Sydney coal per actual horse-power of water raised

side of the engine, and arranged so it could be coupled directly. The pumps are made so that at a low lift, if the outside water is not too high, both pumps are used; but if the water in the river or slough outside the level is over 12 feet, one pump is disconnected and only one run.

With this increase of machinery they were



PLAN OF RECLAMATION PUMPING PLANT DESIGNED AND ERECTED BY THE SAN FRANCISCO TOOL COMPANY.

have now the most extensive pumping plant for reclamation purposes in the United States. The Pearson Reclamation district is one of the largest on the coast. It consists of 8800 acres of very fertile land, surrounded by a well-constructed levee, of an average height of 18 feet, and some 15½ miles long.

When they first began operations there a few years ago, the San Francisco Tool Company furnished a ten-inch pump, with a capacity of 3000 gallons per minute, run by a 12x24 Meyers cut-off engine. This worked for one season, but was not sufficiently effective for the large tract it was designed to drain, being unable to cope with the seepage water. With

by a thoroughly competent and disinterested civil engineer, showed that with only 88 revolutions of the engine, or 264 revolutions of the 15-inch pump, and 234 revolutions of the 12-inch pump, they were able to raise over 16,000 gallons per minute, with an indicated horsepower of about 50, against a head ranging from 9 to 14 feet. The average daily consumption of coal was 3750 pounds of South Prairie screenings for a run of 24 hours.

The next season they took out the 12-inch and procured another 15-inch, making two 15-inch pumps. This was in the fall, but in the following spring an order was given to the Tool Company for a 30-inch siphon centrifugal pump

per hour, the most satisfactory and economical showing so far made by any reclamation pumping plant.

At the time the 30-inch pump was ready to run there were 2000 acres of land under water, resulting from the excessive rains of spring, and by the middle of June the water was all pumped off, and there was a crop of barley in places where the water had been seven feet deep. In one part of the 2000 acres there was a lake of 350 acres seven feet deep.

In the following fall the Reclamation Co. decided to still further enlarge the pumping plant and put in another 30-inch siphon centrifugal pump. This was placed on the other

enabled to increase the acreage under cultivation, and 3000 acres were now added, so that now the whole district is being cultivated. They can now handle all the water that they have to contend with at any time, and it cannot get "the upper hand" of them, or catch up with the pumps.

In the accompanying engravings the plan view shows the two 30 inch siphon centrifugal pumps with the compound condensing engine between the two, so arranged that by the connecting couplings either one can be run independently. Each pump has two separate suction pipes issuing from the sump on the inside

(Concluded on page 217.)



## CORRESPONDENCE.

We admit, unindorsed, opinions of correspondents.—Eds.

## Indicative Plants.

EDITORS PRESS:—In late numbers of the MINING AND SCIENTIFIC PRESS I have read several interesting articles concerning plants as indicators of minerals.

Here in Northern Arizona I have never been able to discover any plant by which mineral-bearing veins or deposits could be traced, and I think as an aid to prospectors this method must always be a very limited one. It is a well-established fact that almost every plant either grows on the north or south side of a mountain, in wet or dry soil, either rocky or loamy, sandy or clayey; besides, most every plant if left to its own choice has certain altitudes and climates to grow in.

Here in Arizona I have noticed on several places, especially on Groom creek, 10 miles south from Prescott, that I could trace mineral-bearing quartz veins for several miles by the willows, wild grapevines and ferns, and a certain pea or bean-bearing plant, but in these instances it was on account of the water in these veins and not on account of the mineral contained in them. This, I think, is a valuable hint to miners and millmen working where water is scarce. Always sink down on some large quartz vein (mineralized or not), and, if possible, running at right angles to the slope of the country, if there is any water to be found; but if you sink for water in the adjoining formation, granite, slate, porphyry, etc., the deeper you sink the less you are apt to strike any water veins.

I enclosed I send you a small sprig from a shrub growing here in Arizona, which is always a sure indication that lime rock in some form can be found. I have never found this shrub above an altitude of 5500 feet. Another beautiful evergreen shrub grows on the same places, but at still lower altitudes, only where lime rock can be found; they call it greasewood. The Mexicans call the other shrub *caojatia*, which in English means "red shrub." This name is very appropriate. The shrub is an evergreen and never shows any more sign of leaves than the specimens I inclose to you. The flowers and seeds also must be almost invisible, as I was never able to see either. The shrub grows from one to four feet high.

The Mexicans claim some valuable medicinal properties for this shrub. Taken as a tea it works on the kidneys, and is in taste a very close imitation to an inferior quality of Chinese tea. D. H.

Prescott, A. T.

## Copperopolis District, Calaveras Co.

EDITORS PRESS:—This district has always been considered a copper-bearing section only. Driving from Copperopolis to Salt Spring valley, over the road that crosses Bear mountain, I was surprised to find a group of gold mines. While gold mines are common in Calaveras, these were uncommon in being located so low in the plains, and also in their size and character. The ledge is of quartz, almost flat, and of an average width of eight feet. On the vein are the Sunrise, Mammoth, New Era, Royal, Good Enough and Emma, all fall locations. On the New Era, Mr. Carter has a Huntington mill in operation, while the Pine Log Co., who own the Royal, Good Enough, and Emma locations, have a ten-stamp mill erected on their property. The Pine Log Co. has been running for seven years, milling rock of an average value of \$12 to the ton. From the Good Enough two lots have been run, No. 1 of 300 tons, giving an average of \$6.20 to the ton, lot No. 2 of 100 tons yielding \$12.37 to the ton. At the time of my calling, Mr. Tryall, owner of the Sunrise, was milling rock at Mr. Carter's mill, and although laboring under disadvantages, in having to have his rock hauled by wagons to the mine, was proving the value of these mines in showing how cheaply, even under his adverse circumstances, where everything save his own labor had to be hired, the ore from these mines can be worked. Of a 20-ton lot, just crushed, his expenses were:

For milling 20 tons @ 37½¢ a ton	\$ 7 50
For all other expenses \$1.00 a ton	35 00—\$45 50
Returns in gold	70 35

Profit in working 20 tons..... \$24 85

This 20 tons was taken out by Mr. Tryall himself in three days making his wages \$8.28 a day in addition to \$2.50 a day charged in mining expenses. Mr. Tryall has thousands of tons in sight. A stream of water averaging 15 inches crosses the mine. In these days of cheap milling, when dividends are pouring out of low-grade ore, like the Homestake by reason of the large body of ore, it is passing strange that this group of mines, located within a half day's drive of Milton on the Stockton & Copperopolis railroad, should rest here comparatively idle for want of proper milling facilities. What is wanted, and all that is wanted, to make these mines prove profitable is an 80-stamp mill. The ore is here in unlimited quantity. It is easily mined and milled, and the nearness to the railroad and the otherwise favorable features make it a fine opening for capitalists seeking large bodies of free-gold bearing rock. It is well worth a visit of inspection, and the strong vein cropping all along the hillside with its eight feet of vein matter carrying an even amount of

very free milling gold throughout, must impress the examiner with this great promise it holds forth; with free water for milling, wood for fuel at \$3 a cord, labor \$2.50 a day, and but 12 miles distant from the railroad at Milton, there is nothing more to be desired in facilities for cheaply milling this rock. E. H. SCHAEFFLE.

Murphy.

## How the Air-Brake Works.

EDITORS PRESS:—The appressed clipping, credited to the Chicago Journal, is rich enough to reprint, although it scarcely needs comment: "I'll bet not one in a hundred of the people who travel on railway trains understands how the pressure of air is used to apply the brakes to a train. When the air-brake was first invented the air was turned into the cylinder under each car when the car was to be stopped, and the pressure was exerted to force the brakes up against the wheels. But at the present day the brakes are held against the wheels by springs, and the air is turned into the cylinders to push the brakes away from the wheels as long as the train is in motion. When it is desired to stop the train the air is let out, and then the springs apply the brakes and stop the train. This last method of using air pressure has great advantages over the old way on the score of safety.

"Whenever an accident happens to a train one of the first effects it is apt to have is to rupture the air pipes leading from the engine to the cylinders under the cars, and that of itself stops the train instantly. It is very important for everybody to understand this matter, because a child five years old can stop a train in 30 seconds from any car in the train if he simply understands how. You will see, if you look for it, that there is a sort of rope projecting from the toilet-room of every car. That connects with the air pipes under the train. If you catch hold of it and give it a little jerk it will stop the train before it has gone 200 yards."

Several questions arise: Did the "railway man" include himself in the "hundred" ignorant travelers? If not, why not? Was he a "railway man"? If so, should he remain in the business? Does he not know too much for the safety of the ignorant travelers? How many who have read this much-copied article are saying: "Well, I never quite understood the air-brake until now." How much better off are they than they were? F. A. ROSS.

Amazon, M. T.

## Natural Gas in San Mateo County.

The San Mateo Times and Gazette says: Natural gas was discovered in San Mateo county somewhat over a year ago. An engineer named Bodwell was boring for oil on Tunitas creek on the south side of the hills about nine miles distant from the point on S. L. Jones' place where boring is now in progress. He found a good well and enough gas to run his engine for the remainder of the time he continued boring for more oil. Some time after a seven-inch pipe was inserted in a spring on S. L. Jones' place near Woodside. The water from this spring was very strong of iron, sulphur and other minerals. A thin film of oil was noticed on the surface of the water, and in various other places in the vicinity and from the well appeared bubbles which were originally thought to be carbonic acid gas, but later were known to be combustible—a match being applied to the bubbles they ignited. Work on the spring was pushed, and a depth of 100 feet was reached, previous to which there was a decided increase in the quantity of gas and a deposit of bituminous shale was struck. A small quantity of gas being stored in a gasometer it burned with an intensity much greater than ordinary coal gas, and was found to have neither odor nor color. As the quantity found was not sufficient to be of use, Mr. Jones contracted to have another well bored alongside of the old one, which could not be developed further, as it had not been run straight. A 10-inch pipe will be used, and boring will be done with a steam engine. A positive contract has been made with two contingent additional contracts for 250 feet each. Mr. Jones has been in correspondence with gas-well contractors East, and if the present plan does not meet with success, which he has no reason to doubt, he contemplates further efforts with the improved machinery used in the natural gas districts in the East. In a letter to the writer last month, after referring to his intentions regarding the work of boring for gas as given above, he concludes: "There is a continual flow of gas from the well which burns very freely, and we have what are considered good prospects; whether realized or not, time and work only can tell."

At Monte Vista (the Ham ranch) bituminous shale has been found, which, when placed in the fire, burned a blue flame. The same formation of rock and conditions exist here as on the Jones place, and it is very probable that natural gas could be found by boring.

On the McCarthy ranch near Woodside, during the past month natural gas has been discovered, and Mr. Thomas Price, the well-known chemist of San Francisco, has upon examination pronounced it to be of superior quality. Mr. McCarthy is about to begin boring.

Should gas be found in this county in quantities sufficient to be of commercial value, it will be of incalculable benefit to the whole county.

## Some Geological Theories.

Source of Auriferous Quartz and Gravel.

EDITORS PRESS:—Some 25 years since it was my fortune to promulgate, through the columns of your valuable journal, a new theory, when considered in its entirety, relating to the origin and method of the introduction of the precious metals into the earth's crust, under the title of "The Igneous Rocks—Their Relation to the Aqueous Rocks and to the Vein Formations," which was illustrated by a diagram similar to the one accompanying this paper. I have copyrighted this title. The theory, as then presented, was based on the supposition that the earth is a burnt-out sun, and that while the rock matter of which it is composed from its surface to its center was in a fluid state from the high temperatures which then prevailed, it was arranged according to its specific gravity, subject, however, to such modifications as attend an elevated temperature. As the metals expand more rapidly by an increase of temperature than do the rocks, there must have been a time, when, if the temperature was sufficiently high, the metals floated near the earth's original surface, and as the process of cooling went on, the noble metals were brought to the surface by volcanic and seismic action.

## The Past History of the Earth

Is recorded in the composition and structure of the solid crust; the successive strata of the aqueous rocks are largely made up of the kind of rock that was being erupted during the period of its deposition. Thus, gneiss is simply altered granite, unmixed with any other kind of rock-matter, while an aqueous deposit of the present age may be made up of the detritus of all the earlier aqueous formations and the debris of the later volcanic rocks, such as the amygdaloidal and basaltic lavas. At first the granitic stratum was exposed to the decomposing action of water and a highly heated atmosphere, and the gneiss system must be co-extensive with the granitic substratum upon which it rests, or rested. After the first solid crust had formed, only such rock-matter as was brought to the surface by volcanic action could be subjected to the disintegrating agencies; hence with each successive geological age the volcanic rock had a less marked effect in giving a distinctive character to the aqueous formations. Yet the flow of each of the distinctive lavas was sufficient in quantity to unmistakably mark each of the stratified rocks up to and including the old red sandstone.

In the accompanying diagram the double line marks the division between aqueous rocks that were deposited by water at ordinary temperatures and the igneous rocks, which have not been subjected to the action of water. The formations above the double line are made up of such rock material as was brought to the surface through the successive geological ages. The perpendicular lines are intended to represent the eruptive era of each of the distinctive volcanic rocks from the points below the double line to points above where volcanoes are represented, thus presenting to the eye the relation of the igneous strata below to the aqueous strata above. The diverging lines are intended to represent the distinctive kinds of intrusive or vein rock, which appear intersecting the aqueous formations, and the igneous strata from which they were successively derived.

So far as my observation goes, unaltered granite appears at the surface only as vein rock, and it remained the intrusive rock all through the period of the folding of the slates, three well-marked geological ages. It was not possible for the schistose rocks to have been tilted, or folded up to a vertical position, over wide areas, and so generally to a high angle, unless they had rested upon a plastic granitic substratum.

During the period of the folding of the slates, the inequalities of the earth's surface could not have exceeded that presented by long, low ridges and corresponding depressions, but when the granitic substratum had solidified from loss of heat, the era of mountain building was inaugurated, and by a process of corrugation the incipient mountain chains became more elevated and extended.

The old red sandstone is the earliest formation to rest unconformably upon the upturned slates, and it received its distinctive character from the vast quantities of metalliferous quartz which must have been erupted from volcanoes during the period of its deposition. What are termed the ancient river

## Auriferous Gravel Deposits

Always rest immediately upon the upturned slates, and I know of no exception. And this is not all. Certain formations of granulated auriferous quartz, which present every indication of being beach deposits, having evidently never been moved by running water, also are found to rest immediately upon the upturned slates. Reference is particularly made to the vast deposit of granulated quartz at Cherokee, Butte county, California. This deposit covers many square miles, varying from a few feet in thickness to 600 feet in depth, and consists entirely of granulated quartz unmixed with any other kind of rock matter, and in which not even a pebble of country rock appears. The free gold it contains is not in strata, but it is uniformly mixed through the whole mass from the surface down to the bedrock. If this huge mass of granulated quartz had been transported by running water from some locality higher up in the mountains, the gold it contains would

have been in strata, and the deposit would also have contained some of the bedrock of the country over which it passed in the form of boulders, pebbles and sand. These facts and considerations make it quite evident that this huge mass of auriferous quartz was erupted in place from a now extinct volcano, and was granulated by being brought in contact with water by which it was suddenly cooled. This formation shows evidence of having been erupted into the waters of a lake or of the sea, and presents evidence of having been subjected in some of its parts to the action of waves upon a beach, especially in an overlying conglomerate of what appears to have been volcanic ashes with boulders, pebbles, bits of wood, leaves, and the cast of a tree with its branches, which appears in a perpendicular wall of the formation. No other proposition can be entertained in view of these facts, than that this huge mass of granulated quartz was erupted in place from a volcano long extinct. This proposition is conclusively proved by the

## Uncovering of a Crater

By the hydraulic miners, which remains in as good state of preservation as if it had been recently formed. This crater is located at the head of Mesilla valley, within sight of the Cherokee hydraulic mines in Butte county, California. The formation where the crater occurs is what is usually termed slate bedrock. Its trend is about 15° west of north, and east of south, and its dip is nearly vertical. It occurs on the western slopes of one of the long low ridges formed during the period of the folding of the slates. In places where the bedrock has been exposed to the disintegrating agencies, spurs three or four feet in height are seen. The bedrock where the crater occurs was covered by a deposit of granulated quartz varying from a few feet to more than 50 feet in depth, which was removed in the process of mining, and immediately over the crater it might have been, I should judge, perhaps 20 feet in depth. The two openings or howls of the crater were filled with granulated quartz, unmixed with any other kind of rock or recent lavas. There is no body or stratum of the recent lavas, either basaltic or amygdaloidal, nearer than about two miles.

The walls of the crater are as compact as slag and are of about the same color, and there the similarity ends, for the metamorphosis by heat did not proceed so far as to effect the schistose structure which is still preserved. A mass of quartz remains intact in the walls of the crater, which must have been deposited from a solution held in the tepid waters of the second geological age. Such deposits of non-metalliferous quartz are not uncommon in the upturned mica schists. I remember seeing one on the coast of Maine more than two feet in width, which had been prospected with the vain expectation that it might contain gold.

Can the date of this crater be traced to any particular geological age? In my mind there is no doubt of it, as every fact points to the old red sandstone as the period of its formation. It must appear self-evident that it was formed at a period more recent than that of the folding of the slates in which it occurs. It is equally certain that it is of more ancient date than the eruptive era of either the basaltic or amygdaloidal lavas. Had any of the recent lavas been erupted from this extinct volcano, owing to their yielding so slowly to disintegrating agencies, a stream of such lava would have remained in place in contact with the crater, which would have flowed from it down the western declivity. A few miles away in a southerly direction, the table mountains are capped by a basaltic lava. Underneath this cap is a stratum of amygdaloidal lava, which overlies a lithoidal deposit, which appears to have been made up largely of volcanic ashes. This last-named deposit rests immediately upon the huge masses of granulated auriferous quartz, which has been perforated by drifts, by the miners, in the expectation of finding the gold concentrated in river channels. But they found no evidence that the huge mass of quartz has ever been moved by running water. The topography of the country precludes the possibility of there having been any connection between the lavas which cap the table mountains and the crater under consideration. The lava of the table mountains flowed in a westerly direction and must have been vomited forth from other craters, while if any of the recent lavas had any connection with the uncovered crater, the flow would also have been in a westerly direction; but no such lava-flow exists.

Further proof fixing the date of the

## Eruptive Era of Metalliferous Quartz

To the Old Red Sandstone period, appears in the fact recorded by geologists that amygdaloid is the oldest or first form of lava that is found interstratified with the formations in an unaltered condition, and that it first occurs in the deposits of the carboniferous period. Amygdaloid of volcanic origin is found overlying the huge bodies of partially decomposed quartz exactly similar in formation to that now being worked by the hydraulic process in the Cherokee mine, and to that which once covered the crater under consideration.

Still further evidence fixing the date of the eruptive era of metalliferous quartz appears in a vein of coal in the northern continuation of the same deposit that once covered the crater above described. In the face of the perpendicular wall of granulated quartz, about 50 feet above the slate bedrock and 20 feet below the highest point of the quartz deposit, there is a vein of coal. By its disintegration on exposure to the



atmosphere, slack was formed sufficient in quantity to cause spontaneous combustion; and the coal stratum continued to burn until the ground was filled with water by a heavy rain, when the fire was quenched.

As there is now no missing link in the chain of testimony upon which to base a reasonable doubt, that there was a period in the past history of the earth when metalliferous quartz was erupted from volcanoes, and that it occurred during the Old Red Sandstone era, seems an established fact. No other proposition can be entertained when considered in connection with broad, self-evident truth, that after the first solid crust had been formed all the rock matter that enters into the structure of the later stratified formations must have been brought to the surface by volcanic and seismic action. Now in relation to the

#### Vein Formations

And the order of their occurrence. In the State of Maine I have observed veins of granite containing plates of unbroken mica traversing a formation of gneiss. I have also observed granitic veins traversing the mica schists and the porphyritic slates. At the town of St. George on the coast of Maine, I observed a well-defined vein of granite suitable for building purposes, and about two feet in thickness at tide-water, running at right angles directly across the upturned porphyritic schists. The granitic veins are as distinctly marked on the Atlantic Coast as they are on the Pacific Coast.

In the Sierra Nevada of California well-marked granitic veins occur in the greenstone schists and other talcose slates. The granitic veins generally conform with the trend and cleavage of the upturned slates, but in some instances where the slates are at a low angle the vein rock comes up through to the surface directly, irrespective of the natural cleavage, and occupies a position more nearly vertical. Nothing can appear more certain to one who uses his eyes than that granitic rock was intruded to fill fissures caused by upheavals all through the first three geological ages, and through the entire period of the folding of the slates. Such being the fact, porphyry, the eruptive rock of the second geological age, should be the intrusive rock of the fourth or old red sandstone era. And such is the fact, for I have observed veins of porphyry of varying thickness from a few inches to more than 40 feet in width, in formations belonging to the old red sandstone era, but they never occur in a more recent formation. The magnesian rocks should have been the intrusive rock matter of the fifth geological age or carboniferous era. Although many veins of soapstone have fallen under my observation, no such vein traversing a deposit of the carboniferous era has existed to my knowledge.

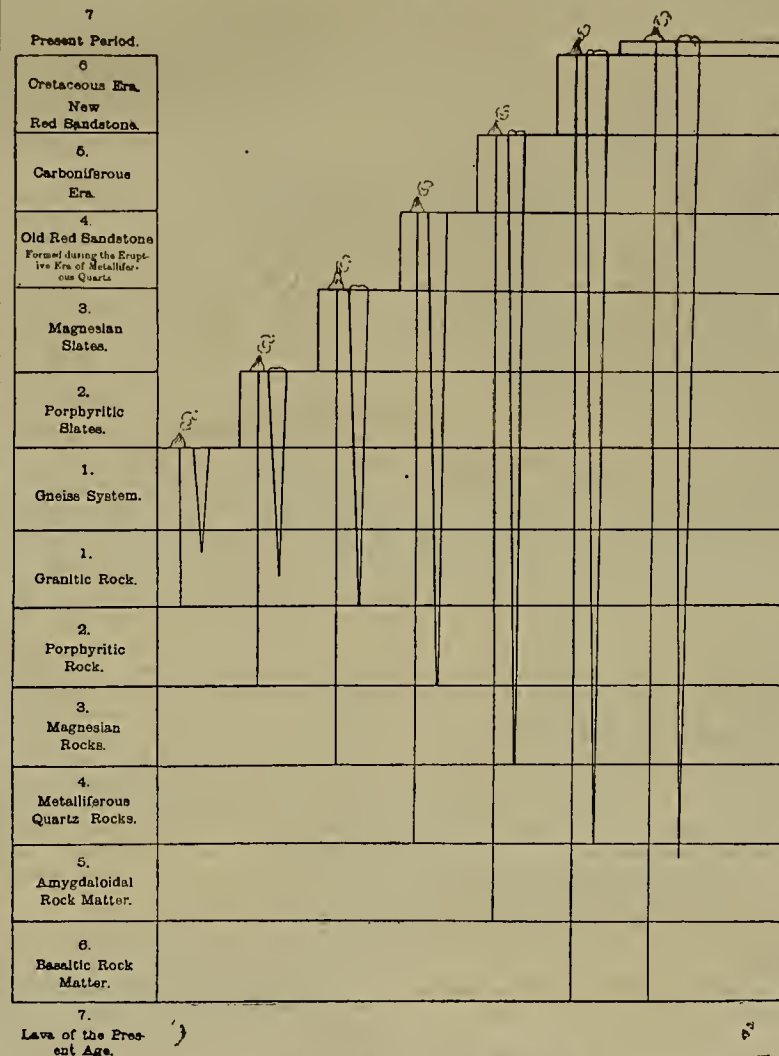
#### Metalliferous Quartz.

According to the order of occurrence indicated by the diagram, should have been the intrusive or vein rock of the sixth geological age, or grand division in the earth's past history. That there were two periods wide apart, during which the metals were brought to the surface by volcanic and seismic actions, must appear quite evident to the intelligent observer. In the canyon formed by the Yuba river, a few miles east of Strawberry valley, Yuba county, Cal., is a copper-stained quartz vein which presents unmistakable evidence of having been formed at a period so recent that the topography must have been quite the same at the time of its intrusion as it is to-day. It follows the trend of the slates diagonally across the river and up the steep sides of the canyon. On observing the vein, my first thought was, that inasmuch as the ancient river nuriferous gravel beds are situated on the highest ridges of the country above, and that the Yuba river cut diagonally across these ancient river channels hundreds of feet to the bedrock and then furrowed a channel across the western slope of the Sierra Nevada, which in the locality named is not far from being 2000 feet deep in the hard bedrock of the country, and the immense period of time that must have been involved in effecting such great change in the topography of the country, that the metalliferous quartz zone in the igneous section of the earth's crust must be very much wider than I had hitherto supposed. Up to this time I had entertained the idea that the eruption and intrusion of metalliferous quartz to fill fissures caused by upheavals occurred in the same geological age or period in the earth's past history. Upon reflection, the presence of a recently formed quartz vein in such a locality led me to suspect that such a proposition must be abandoned. In casting about, at this particular juncture, it occurred to my mind that I had observed well-marked veins of granite in the upturned slates in a vertical position, and evidently granite continued to be brought to the surface by seismic action long after its eruptive era had passed. Here, then, is the clue which may lead to the true solution of the problem. This led to the question of how high up in the series do granitic veins occur, or through how many geological ages did granite continue to be brought to the surface to fill fissures formed by upheavals.

After much reading of works on geology, and of study, which involved the chemical composition, color and texture of the schistose formation, I determined that granite was the intrusive rock through three geological ages, and that it ceased to be brought to the surface by seismic action with the close of the period of the folding of the slates. Here, then, was the basis for the construction of the accompanying

diagram, representing the plan of the structure of the earth's crust, and the relation of the aqueous to the igneous rock strata of which it is composed.

While there is abundant proof that veins of metalliferous quartz were formed during recent geological time, there is no evidence that it is the intrusive rock of the present period. The discovery of a vein of amygdaloid would present evidence that the quartz stratum had become solid from loss of heat and the period of its intrusion to fill fissures had ended. Inasmuch as amygdaloid is the oldest lava that is found overlying the ancient auriferous quartz gravel deposits, according to the plan presented by the diagram, it should be the intrusive rock of the present geological age, and the existence of a well-marked vein having its lithoidal characteristics should be regarded as the keystone in the arch of testimony supporting the theory the diagram is intended to illustrate. Entertaining such thoughts, I looked for 10 years for such a phenomenon, and was rewarded by finding a well-marked vein of amygdaloid presenting all the peculiarities of structure pertaining to veins of granite, metalliferous quartz or other veins formed by seismic agencies. The



DIFFERENT GEOLOGICAL PERIODS.

vein occurs in altered porphyry, is about 20 feet in width, and where it is cut for the road-head of the C. P. R. R. it carries what miners term a "horse" of porphyry four or five feet in thickness. This vein is located about one mile west of the Truckee hotel in the town of Truckee, California, and although 15 years have since elapsed, such veins are so infrequent that it is the only vein of amygdaloid that has fallen under my observation.

The protrusions of dark-colored rock that were formed at points where volcanic light appeared about six hours of the first shock of the great earthquake that occurred in Inyo county, California, in 1870, might prove, upon examination, to be amygdaloid. There should also be a vein and protrusion of amygdaloid in the mountains east of Iriquoipa, South America, that were formed where volcanic light appeared, turning night into day, during the great earthquake and tidal wave that occurred at that place some years since.

To my mind one well-marked vein of amygdaloid, bearing unmistakable evidence that it was formed by seismic agencies, is sufficient to indicate that we are now on the seventh geological age, and it gives assurance that others will be found which were formed during the occurrence of recent earthquakes, and also that still others may be observed and studied while in process of formation in the future.

Since writing the above I have been informed of an additional fact that there is a quartz lode carrying silver-bearing galena, cutting across the coal strata and up through the surface. The formation above the coal is sandstone. It is located three to four miles north of Crested

Buttes, Gunnison county, Colorado. My informant is Mr. Jno. B. Wilford, 3330 Lawrence street, Denver, Colorado. He refers me to the Anthracite Coal Co., Crested Buttes, Colorado, for further information.  
Virginia City, Nev. F. A. HERRING.

#### Professor Egleston in the New York Circus.

EDITORS PRESS:—While waiting for the editor, I sat down in his cozy nest, stuffed two feet high with newspaper clippings, and soon dozed off. I dreamt I was the Louisiana orphan boy inside of the wheel whence the lottery tickets are drawn. Being within reach of what would make me happy for the rest of my days, I stretched out my hand and awoke. I found that I had caught a piece of the New York *Financial and Mining Record* of Nov. 5, 1887, containing a criticism on Professor Egleston's new book on the "Metallurgy of Silver, Gold and Mercury in the United States." Disappointed I was, still I read the essay. It was signed with a name which I had seen before,

and the reading public has enjoyed the personalities. Of course, one does not remember all the names on the playbill, still, by using the mnemotechnical style of Silas Wegg, I remember the metallurgist who signed the critic of Prof. Egleston's metallurgy as the gentleman with the many initials.

When that gentleman sat down to write his critic of Prof. Egleston's book, he evidently was going to have a square meal on it. The pen had been put to the grindstone and the inkstand freshly filled with extract of gall. Only, when the pen is so very sharp, it does not take up much of that fluid at one time. So the writer opened the feast with prayers from "Erasmus, Luther's cotemporary," translated from Goethe's Faust, several dreadful warnings to professors in general as a kind of appetizer, and commenced the menu with the professor's preface. That saved the unhappy author—at least a piece of him. There was so much substance in that soup, and Erasmus and Goethe had taken so much valuable paper, that the *Financial Record* being also an economical one could only afford just enough room for an onslaught on the professor's punctuation, a sweeping blessing on the rest and for the initials.

Meanwhile the editor came in and showed me the book which I had just seen getting eaten up as if it was a subject in disgrace of King Mtesa of Uganda. The editor that I was talking to said he had not yet reviewed it because they had run it down so dreadfully. This "they" included another New York mining paper where another member of the Circus had taken powerful bites. Having dabbled, myself, in my own small way, a little in metallurgy, I became curious to discover where, why and how the author had offended the Circus, asked permission and took the book home.

In the preface the author thanks 37 different parties for information furnished, and among San Francisco people Mr. Scott of the Union Iron Works and the managers of the Miners' Foundry, "who kindly allowed me to take tracings of drawings and to examine the mills which they have constructed." "Who ever," fairly scream the initials, "has seen a learned author thank the manufacturers and vendors of machinery for imparting information concerning the ware they deal in?" This is courtesy bordering on vulgarity, if not even worse than this. Prof. Egleston in his preface thus advertises not less than five machine shops. Now, there is virtue with a vengeance! We have to go back to the Holy Origins to find the like. To add how much I was shocked myself would be only painting the lily and would appear as if I wanted to share the odor of sanctity of the virtuous critic of the *Financial Record*.

Still I must confess that I, who have yet to improve, can learn much from Prof. Egleston's book. The present methods of American practices are fully and honestly treated. I thought first the professor had committed a certain great crime, but I was mistaken. The composition of Mr. Alterego's "Extra Solution," which is dispensed at the Circus as a free drink, is quite seriously given and taken. For those of the readers who, in a patriotic way, are fond of new American drinks, I state that to act really beneficially on the chemical constitution of the ore body it is to be taken with Prof. Self's roasting oven and several other patents, to be had at the Circus at reasonable rates.

But to accommodate customers, Mr. Alterego's extra solution will be sold also in separate bottles, although, of course, at an advanced figure. No bottle sold without Prof. Self's fore and aft testimonials. Mind the trademark: A shuttlecock with the signature of the hatterdors. There is in Prof. Egleston's book less wit and grit than in Dr. Percy's Metallurgy, but the doctor is an established authority in England for 30 years and may indulge in a little mirth occasionally. If he lived in New York and got a pull in the Circus 52 times a year, not to mention any odd Christmas number, he and his good humor would soon part company, a thing which we should much regret for his sake and for our own. There is also a dearth in chemical formulas noticeable, but herein the professor acted wisely. Just throw a handful of such formulas into the Circus! Scrambling for them as for peanuts? No, sir; you can only compare it to a football thrown among a dozen sophomores at recess-time. Mrs. Eris' golden apple is a favor at a German in comparison. There are many other omissions and commissions in the book; for instance, to forget the important work at some mill somewhere done by a gentleman connected with the Circus, or to describe a process annihilated by another gentleman of the same institution. I admire the courage of Prof. Egleston in praising Bruckner's rotary roaster with poor Bruckner and his patent dead and gone, and the other patent roasters still alive and kicking. I have no doubt that there are many errors in the professor's book, but a few bad men claim to have found some even in the Bible. Unfortunately, the positive metallurgy writes no books, but only correspondences and pamphlets on its own patented revolutions of science with new editions for important evolutions of those revolutions since discovered. Thus we have to be pleased with what we can get. It is true a person in metallurgical trouble may write to New York to get at the truth of things. He merely has to state his sore case in the Circus and to send a confession of his low mental condition and of his impecuniosity. The first confession will be accepted readily, the other one not without an affidavit.

San Francisco, April 2d.





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SAN FRANCISCO

Saturday Morning, April 7, 1888.

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## Passing Events.

They are having quite an excitement over gold discoveries on the Provo river, Utah. A number of locations have been made, all in quartz. The local papers do not seem to think much of this region and place little faith in the reports of assays.

Great interest is being taken in the mining counties on the subject of the Biggs hill now before Congress, which provides that a proper investigation of the hydraulic mining question shall be made by disinterested Government engineers. There is, of course, much opposition from the valley counties, where they object to the reopening of the discussion. A thorough, impartial investigation would be beneficial to all concerned.

The operations of the French copper syndicate have had the effect of increasing the value of copper properties in this country, as the mines are assured of good prices for some time to come. "Copper stocks" are now booming.

The people of Lake county are rejoiced over the fact that they are at last to have a railroad, the arrangements having finally been completed. El Dorado county, too, feels elated now that the rails have been extended to Placerville.

A great deal of attention is now being turned to the tin mines of the Black Hills, Dakota. Some good solid development work ought very shortly to prove the value of the deposits.

## Petroleum Fuel.

The verdict of the coroner's jury in the Julia disaster (which is printed in another column) and the action of the Insurance Union in raising rates will probably, for the present at least, stop the rapid increase in the use of petroleum for fuel in making steam. In the MINING AND SCIENTIFIC PRESS a few months since we gave an account of the discussion between the Insurance Union and the Supervisors concerning the use of this fuel. The Insurance Union insists on a 90-degree fire test, and the Supervisors are satisfied with one of 80 degrees. A number of permits have been granted by the Supervisors for use of this fuel in the city, but the Insurance Union has adopted certain rules of its own. It will not permit petroleum to be used for the generation of steam in any building within 60 feet of any other building; an additional rate of one-fourth of one per cent is charged; the petroleum must stand a temperature of at least 90 degrees before emitting an inflammable vapor; the iron storage tank must not hold over 1000 gallons; there shall be only one at each place, and it must be two feet underground outside of all buildings; the supply tank must not hold more than 110 gallons, must be connected with the storage tank by a pipe, so that every evening the supply-tank oil must be run back into the storage tank; that the Fire Warden and Fire Marshal may at any time go to the storage tank and test the oil; two steam pipes shall be placed, one connecting the boiler with the supply tank, and the other one connecting the boiler with the storage tank, and that each of such steam pipes shall be provided with a shut-off cock, so arranged that steam can be readily directed into both (or either of) such tanks, through said pipes, or either of them.

It is pretty certain that even under these restrictions by the Insurance Union, oil-fuel has "come to stay." Some manufacturers testify to a saving of 70 per cent in fuel bills at present prices of coal. Even with coal at normal rates, considerable saving is effected both in cost and handling of the fuel. The production of this fuel in California is now about 1500 barrels a day, and 5000 barrels is a limit that will not be reached for some time. The oilmen say that three barrels of oil are equal in heat-producing power to a ton of coal. Oil costs \$1.50 a barrel. That is \$4.50 for fuel that in the form of coal costs from \$5 to \$8 ordinarily and \$17 occasionally. The oil sold for fuel is 80 degrees test. If the lighter products are taken from California oil, the residuum is so thick that it is difficult to move it in pipes. It is claimed by the oilmen that oil is perfectly safe if used properly, and the manufacturers and foundrymen who use it are satisfied as to its safety. The iron drums of oil in the late fire at the Fulton works were not destroyed, and the oil was found intact after the fire.

The difference between the oilmen and the insurance men will, no doubt, be reconciled in time. The former insist that an 80-degree fire test is sufficient, and the latter want it placed at 90 degrees. The insurance men also want some guarantee that the oil furnished manufacturers will be of the prescribed character. They say at present there is none; that any kind of oil is furnished and no one tests it. The dispute has been going on for some months now. The supervisors are issuing permits to use and store 80-degree oil, and the insurance men refuse to insure unless it reaches 90 degrees, and then make an extra charge when it is used.

As to its use on ferryboats, we have given in this paper the details of the results of trials for efficiency and economy. The coroner's jury in the Julia disaster now condemn its use on steamers, and say it should be prohibited by law. But there is a difference of opinion in this also. The oil-tanks on the Julia were found full of oil after the explosion and fire, though it was at first thought the oil had exploded. No oil did explode. Still there was a fire after the explosion, and this was laid to the oil; hence the verdict. In view of the opinion, the Southern Pacific Co. have discontinued the use of petroleum for fuel on the Oakland ferryboats. It would be unwise for them to continue it, since, in case of an accident, after the verdict of the jury referred to, they would probably be liable to very heavy damages.

The manufacturers in this city who are using the oil fuel, and who wish to continue, are in hopes the differences will be settled, and that some satisfactory solution to the whole problem will be found. They do not wish to have anything unsatisfactory about any more than the insurance men do. But they do want a cheap fuel, such as this is.

## The White Metal in the Ascendant.

An Act having been passed by Congress in 1882 authorizing the Secretary of the Treasury to purchase United States bonds with the surplus that had accumulated in the National Treasury, that official has since bought up these securities to a large amount. This law of 1882, by reason of its having been attached to the general appropriation bill of that year, having caused some to question its validity, a new bill of the same purport was recently passed by the House and sent to the Senate, where it was favorably reported on by the Committee on Finance. The retirement of these bonds has forced the National banks to largely contract their circulation, these bonds being the basis on which they issue their notes. This contraction has already reduced the circulating medium of the country to the extent of sixty millions or more, an amount that must, of course, be steadily augmented in the future.

With a view to making good this deficiency and restoring the circulating medium of the country to its normal condition, Senator Stewart of Nevada, when the above bill came to be considered in the Senate, offered an amendment which provides that the owners of gold and silver bullion may deposit the same in the mints and assay offices of the United States, and receive certificates therefor, which certificates are redeemable by the Government, and are to be a legal tender for all dues.

This amendment was vigorously opposed by the monometallists in the Senate, who, being unable to defeat, had recourse to various expedients to postpone action upon it, seeking meantime to substitute in its stead other measures less objectionable to the bond-holders and the creditor classes generally. At the instance of Senator Plumb of Kansas, the Senate amended the original bill by instructing the Secretary of the Treasury to issue greenbacks in place of the banknotes retired. Senator Beck of Kentucky offered an amendment whereby the Secretary of the Treasury is authorized and directed to purchase at the market price an amount of silver bullion equal to the circulation surrendered by the National banks, the same to be coined into standard silver dollars, this being in addition to the amount of silver bullion that official is authorized to purchase under the present Silver Coinage Act.

On the 4th inst., the Beck amendment to the Bond bill was adopted in the Senate by a vote of 37 to 13, showing that the opinions of that body had undergone a decided change during the discussion had of its merits. Senator Stewart, finding that he could not, in the present temper of the Senate, carry his own amendment, voted for that of Senator Beck. But the Nevada Senator has not abandoned his favorite measure, which it is his intention to bring up again, and urge on the attention of the Senate when conditions seem more favorable. That it can be enacted into a law at the next session of Congress is highly probable, as it has already many warm supporters in both branches of that body.

While the Stewart amendment embodies a broader policy in dealing with the silver question than the amendment introduced by Senator Beck, the adoption of the latter is something gained. It is, in fact, a long stride in the direction of silver restoration in the United States, and which, finally accomplished, must hasten its rehabilitation in other countries.

ACADEMY OF SCIENCES.—At the last meeting of the California Academy of Sciences, 176 volumes of books were received. Rev. P. V. Veeder read an essay on "Progress in Japan." Mr. Veeder was formerly principal of the old City College in this city, succeeding Dr. Burrows. He went to Japan and remained at the University of Tokio for some years. He said that the Japanese University was modeled after the best of American and European colleges, was opened in 1873, and that it is the peer of our own Harvard or Yale.

## The Alaska Catamount Let Loose In New York.

We learn through the editorial columns of the *Engineering and Mining Journal* of New York, that a number of companies have been organized in that and other Eastern cities for operating in the quartz mines of Alaska. A great many shares of these companies have been worked off on the public, who are buying them, it appears, on the representations made by the manipulators and others interested in the promotion of these mining schemes, reference being constantly made by these parties to what has been accomplished in that country by the Treadwell Company. That this company, whose mines and works are located on Douglas island, has an excellent record cannot be denied, and in so far as the claims of these new organizations are situated on the Treadwell vein, their prospects may, as a rule, be considered fairly good. Not that this vein has been proven for any great distance, but because an ore channel of such masterly proportions and traceable by surface indications for several miles will be very likely to contain more than one fruitful spot, and may even contain a good many. But as there is no certainty of this, investors, even in claims known to be on that lode, take some chances when buying in advance of exploration.

But many and perhaps most of the claims belonging to these new incorporations are not, it seems, located on the Treadwell vein, but on lateral and in some cases far distant lodes, a portion of them being on the main land and not on Douglas island at all; a fact that further detracts from their value, inasmuch as none of these outside lodes have been much developed, nor have any considerable working tests of their ores been made. The Treadwell Company is the only one that has made any bullion production in that country; is the only one, in fact, that has yet got a mill in operation. Two or three others have put up mills, but none of them have as yet been started, though one at least was completed some six or eight months ago. Why these mills have not been set at work it is difficult to understand, unless, to be sure, the owners may have thought the plan of selling their shares a surer way for replenishing their treasury than the working of their ores.

That Alaska contains many valuable deposits of gold-bearing quartz, all of which will eventually be opened and worked with profit, admits of no doubt. That large numbers of people will lose heavily through the purchase of mining shares in that region is to our mind equally clear. That our New York contemporaries has good reason for denouncing the manner in which these shares are there being disposed of, we venture to say. That a majority of these Alaska companies belong to the family of the untamed felines is more than probable, and it will be strange indeed if somebody does not get badly scratched by them. If there were but one or two of the creatures at large, the case would not be so bad; but a numerous brood of these young catamounts seems to have been littered in that city, where the credulous and the gullible being many, they find ample prey. We counsel Eastern investors that before buying they carefully inspect this class of "ascutrities," lest by and by, when speaking of their ventures in Alaska, they may feel that they can best give expression to their anguish by omitting the final syllable of that name!

MRS. CONRAD WIEGAND, her granddaughter and her sister, starved to death at Mount Holly, N. J. They were without means of livelihood, and did not tell of their sufferings until too late to be saved. Mrs. Wiegand was the wife of the late Conrad Wiegand, the assayer of Virginia City, who was for years well known all over this coast. He was a learned man and wrote frequently for the MINING AND SCIENTIFIC PRESS and other journals. It appears now that some property at Virginia City belongs to his estate, and that it produces a monthly income, but for some reason Mrs. Wiegand did not receive it promptly. It scarcely seems possible that such a distressing circumstance could occur in this age and in a civilized and settled region.

HEAVY contracts for wood are being made in the Sierras by the Central Pacific, the locomotives having been changed from coal to wood-burning.



## Land Reclamation.

(Continued from page 213.)

of the levee, and there is one 40-inch discharge pipe from each pump passing over the levee and going down an incline to the river. The lowest part of the discharge pipe is always submerged.

The pumps are primed from the jet-condenser, which acts as a condenser for the com-

set the full distance across for collecting floating vines, debris, etc. The grating is set at an angle, the same as the cow-catcher of a locomotive, so as to direct the weeds, etc., off to the sides, and the inclined form tends to make the material rise to the upper portion of the grating. The sump proper is 30 feet wide and 12 feet deep, with bottom and sides perfectly smooth, the mouth expanding like a funnel until it is 50 feet wide, and here the grating or

is discharged under any given circumstances—which can be increased from a minimum of say 10,000 gallons per minute, to a maximum of 60,000 gallons per minute for each of the two large pumps.

This engine has, like all other engines made by the San Francisco Tool Company, received the greatest possible care in its design and workmanship. The working parts are reduced to the fewest number possible without sacrific-

levee are bunkers to hold 400 tons of coal. The floor of the bunkers inclines 30° to the furnaces, and there are sliding doors, so the supply is drawn to each furnace without handling. Schooners which come up the river hoist their cargoes of coal directly into the bunkers. The engine-house building, sleeping-rooms, etc., are artistically and substantially made. They are of rustic exterior with circular windows and other ornamentation. The interior is tastefully finished. The whole plant was made by the San Francisco Tool Company under the supervision of Mr. P. J. Van Lohensele, for the San Francisco Savings Union, and as the largest reclamation plant in the United States, reflects credit on the designers and builders.

## Speed's Electric Railway.

In the application of electricity to railway propulsion there are two systems; let, in parallel, and 2d in series. The first corresponds to the method of incandescence lighting; that is, with the small glow lamps invented by Edison. The second to arc lights, seen on our streets. In the first, whatever current is sent out along the wires is divided, and quite impartially, among all the lamps to be lighted, each one of which receives its exact share, so if there are four lamps each will receive one-fourth. It is evident that the current originally must be very large to permit of division into many small parts and yet furnish enough for each to make it burn brightly. Large currents require correspondingly large conductors, which increase in size very rapidly as the distance increases. For instance, if a given number of lamps at a certain distance from the dynamo requires a conductor of a given sectional area, the same number of lamps twice as far away requires a conductor of twice the sectional area, or four times as heavy. In arc lighting the current which burns the first one from the dynamo passes on to the second, and so on throughout the whole series. The current causing the first one to burn brightly will have the same effect upon each of the others if the electro-motive force or pressure is increased proportionately to the number. The current (measured in amperes, the unit of quantity) in this case is small, and therefore the conductors may be small, and also long, without material loss. The nearest analogy is the flow of water in pipes. If the quantity is large and the pressure small, the pipe must be large. If the quantity is small and the pressure high, the pipe may be small. It is in this that the economy of a series system over the multiple system are most apparent. All of this applies to electro-motors as well as lamps. Electricians are fully aware that the coming successful application of electricity to railways is on the series system. In no other can more than a few cars be simultaneously operated at any distance from the source of power.

The patent obtained through the MINING AND SCIENTIFIC PRESS Patent Agency by F. M. Speed of this city, March 27th, is supplementary to a patent granted to Fleming Jenkin, late professor in Edinburgh University, one of the most noted English authorities upon electrical matters, who, as long ago as 1882, clearly foretold that finally the series system must obtain if the mechanical details could be perfected. Mr. Speed has made an important advance in the electrical administration, so to speak, of the currents to maintain the series relation of the motors and care as they pass along the road, which consists of an improved means for operating the switches, and a peculiar arrangement of the conductors to permit of said switches being operated automatically without interference with the current operating the motors. The patent also covers other details.

At the Plumae-Enreka mine the ore from the 76-cable is run down to the ore station by a wire cable which is 1600 feet long, then hauled half a mile through snowdrifts to the mouth of the Mohawk tunnel, then loaded again on the double-track tramway, sent a distance of 1400 feet to the 60-stamp mill, which has all the modern improvements of the day—three large rock-breakers, 22 concentrators and pans, 12 self-feeders. The machinery is run by a Knight water-wheel.

It is said on the authority of the London Times that the principal American lead dealers have contracted with European firms to sell their output at £16 sterling per ton for three years. This means a continued high price.

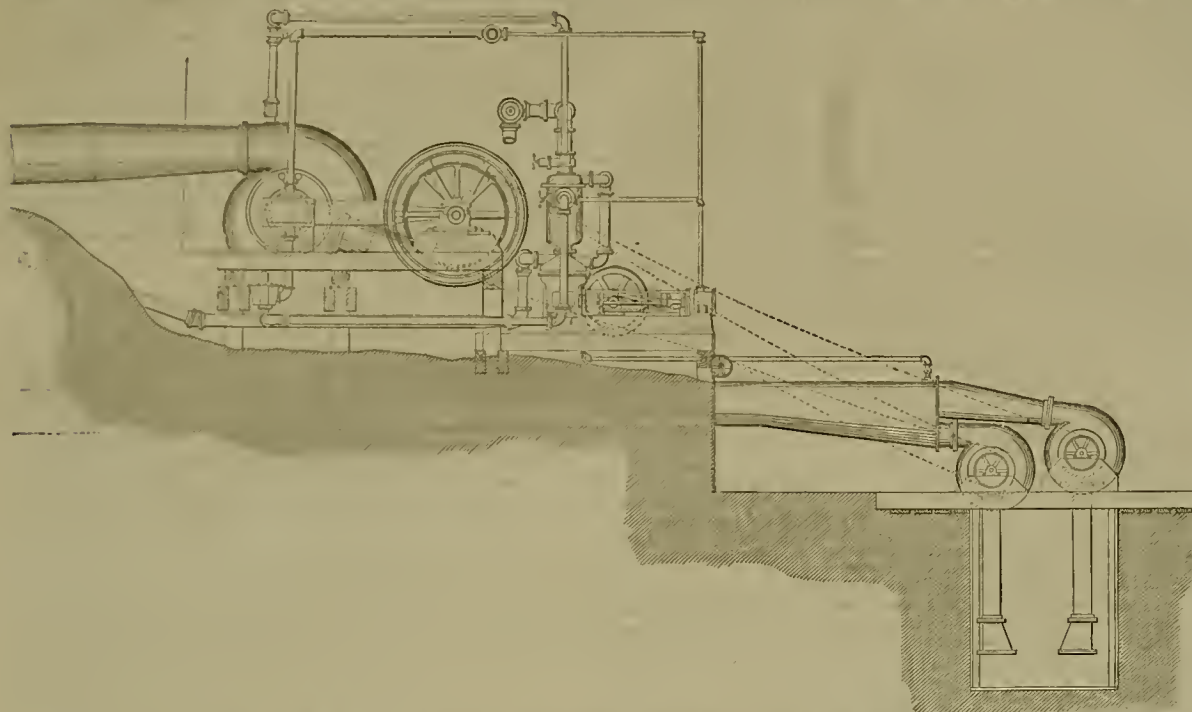


FIG. 2.—SIDE ELEVATION OF PUMPING PLANT AT A-B ON THE PLAN.

pound engine and the 12x24 Meyers' cut-off engine, which also forms part of the plant and is shown in the plan. The pumps, on being primed, have the valves left partially open to the condensers, so that any air accumulating is

strainer is placed. This enlargement at the entrance is designed so that even the obstruction at the grating, in case of floating weeds, does not impede the flow of water the full size of the sump proper. As the sump has straight

ing its efficiency, and are thoroughly balanced. The bearing surfaces are of exceptionally large area, and the lubricating arrangements most perfect. The most of the forged parts are of the best hammered steel, and all the materials

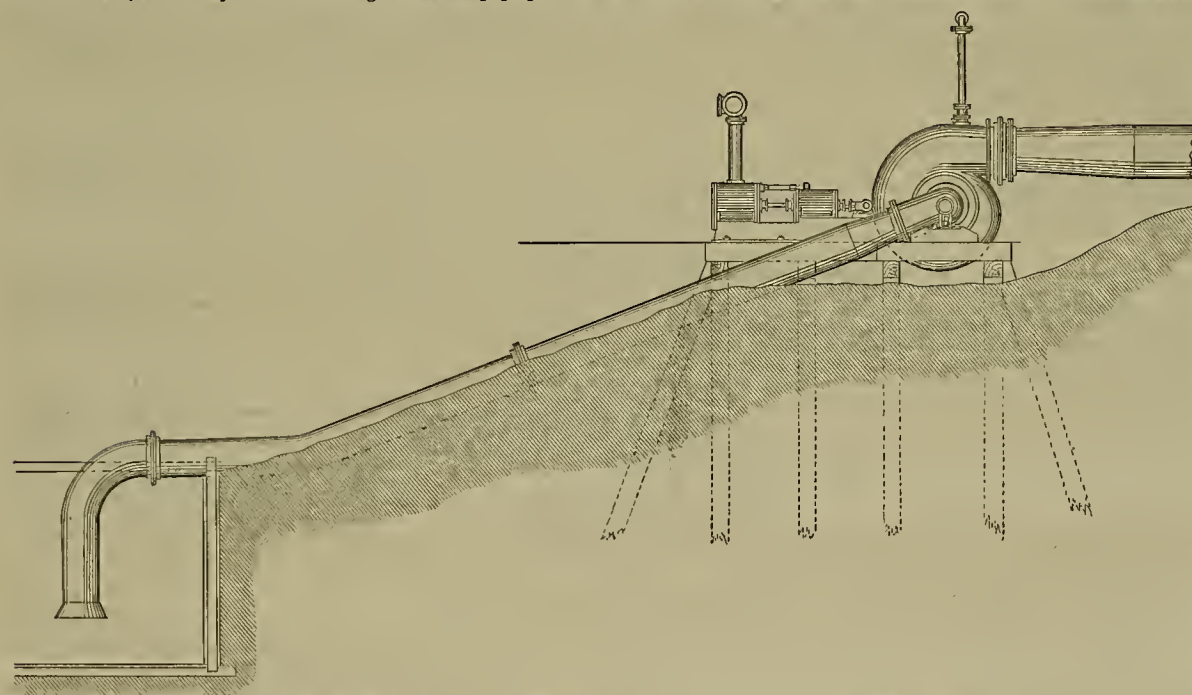


FIG. 3.—SIDE ELEVATION OF PUMPING PLANT AT C-D ON THE PLAN.

taken up by the condenser and the siphon action is never impaired in the pumps.

The two 15-inch pumps stand directly over the sump, each having two suction pipes and discharging into one large discharge pipe. They are driven by the 12x24 Meyers' cut-off engine by belt connections. They are now used to drain the land when there is not enough water in the ditches to supply the large pumps.

Fig. 2 is a side elevation of the 12x24 Meyers' cut-off engine and 15-inch pumps, condenser and 30-inch pump, looking from the boilers toward the compound engine.

Fig. 3 is a side elevation of the compound engine and 30-inch pump, also showing angle of the four 28-inch suction pipes.

The sump is arranged in a peculiar manner. The mouth is 50 feet wide, and has a grating

sides and bottom, where the water passes through the straight portion, it is easily measured, and the amount of water pumped readily calculated.

The large engine for the 30-inch pumps is a compound condensing engine, with variable expansion gear—the latter enabling the engineer, without a moment's loss of time, to change the point in the stroke at which the steam is cut off and to modify the speed and power of the engine as the change of lift or quantity of water discharged requires.

The diameter of the fly-wheel is 58 inches, that of the low and high pressure cylinders, 14 inches and 26 inches respectively. The stroke is 18 inches; the number of revolutions is from 130 to 210 per minute, according to the height the water is to be raised or the quantity de-

need in their construction as well as the workmanship are of the best description.

In a test of one of the 30-inch pumps run by the engine, the following results were shown: The total discharge of the pump was 37,907 gallons per minute, lifting water 11 feet 7 inches high, the engine developing 124.8 horsepower nominal, consuming 12,125 pounds of average Sydney coal in a run of 24 hours.

Steam is furnished for this plant by a battery of four boilers, two 48-inch by 16 feet, and two 60-inch by 16 feet. The boilers are arranged so that they may be disconnected at any time. There are two feed-pumps. The pumps are also connected with fire hydrants throughout the buildings, and connected to a tank at an elevation on the building.

In front of the boilers and on top of the



# MECHANICAL PROGRESS.

## Recent Advances in the Iron Industry.

Mr. Laurean of Philadelphia, a most competent authority, says: "No revolutionary progress has been made lately in the metallurgy of iron and steel, but improvements are steadily taking place which tend to decrease the cost of production and increase the output. In this country especially is the development of mechanical appliances noticeable. Improvements in processes are more marked in Europe, where the utilization of inferior iron for the manufacture of steel by the basic process has been made a special study and is still developing, mainly in the open-hearth practice.

"In our country the last two years have witnessed astonishing activity in the construction of new blast furnaces and steel works. Our firm alone constructed ten entirely new blast furnaces (eight of them being in Tennessee and Alabama), remodeled ten more and built six steel works, representing in all an outlay of over \$2,500,000.

"In connection with the construction of blast furnaces the use of fire brick hot-blast stoves used in preheating the blast is becoming more and more prevalent. A cast-iron stove heats the blast to say about 900° F., while a fire-brick stove can furnish up to 1600°. The extra amount of heat introduced in the blast decreases correspondingly the consumption of fuel, so that in well-managed furnaces using good ores the past year has seen the lowest fuel consumption to the ton of iron ever reached in this country, and probably in the world. Published results show that one gross ton of iron has been made with 1850 pounds of coke, and many furnaces show an average record of between 1900 and 2000 pounds of fuel.

"Fire-brick hot-blast stoves have been greatly improved lately. They have been made more manageable, their construction more simple and the first cost lower. Our firm constructs a special form of fire-brick hot-blast stove, combining the Whitwell and Cowper systems with certain valuable improvements patented by our Mr. Fred. W. Gordon.

"The stove is well known now in the United States by the name of the Gordon-Whitwell-Cowper stove. We have built 60 of these stoves in the last two years.

"In the construction of Bessemer plants nothing of importance is noticeable. A great many works of small capacity have been built with both stationary and tilting converters, and more or less ingenuity has been shown in the designs, but the main features remain what Bessemer and Alexander L. Holley made them.

"In the construction of Siemens' regenerative furnaces, important modifications have been adopted. In the usual form the melting chamber, or hearth, is built standing upon the regenerators. In the improved forms the hearth is mounted upon columns and completely separated from the regenerators, which stand in detached pairs at each end of the hearth, as in the Batho-Ruey furnace, or in connected groups of two at each end, as in the very successful furnace built by us at Zanesville. In both these types the melting chamber is round instead of oblong, as usual.

"In the manufacture of steel, nothing very new has come to the surface during the last year. Two establishments have fitted themselves up for using the basic process—one at Pottstown, Pa., the other at Homestead, Pa. The Pottstown establishment uses the Bessemer process, while at Homestead open-hearth furnaces are used. The developments have not gone far enough to announce results.

"Great progress has been made in the manufacture of steel castings. The process under which all successful makers now work was developed at Torrenoire, France, some ten years ago. American manufacturers have applied their usual ingenuity, and now we may say we can produce as good steel castings as Europe. The casting of rolls weighing nearly 50,000 pounds and an anvil block weighing 66,000 pounds at the Ohio Steel Company's, Cleveland, Ohio, and the casting of the experimental nine-ton gun at the Pittsburgh Steel Casting Company's, give an idea of what can be done in large blocks. But for a genuine test of difficult steel-casting practice we will mention the test often accomplished at the Solid Steel Casting Company's, of Alliance, O., of casting 10,000 pounds of steel (the entire charge of one open-hearth furnace) into 120 molds."

**GIVE THE BELTS REST.**—Most shopmen are aware that it is better for belts to relieve the strain upon them whenever they are out of use, and it is a good practice to run belts off from lathe cones and in other places where it can be conveniently done every night when quitting work. Any one who has tried it, and observed its effects, knows that a leather belt so treated pulls better and lasts longer than if kept continually strained up. Of course it is by no means possible to treat all belts in that way, but whenever it is practicable the rule should be observed. A writer in the *Practical Engineer* (Manchester) says an experiment was made as follows: New leather belts, made from the same hides, were put on two engine lathes which stood side by side, and were used upon the same kind of work. One of these was thrown off every night, while the other was never released. The latter had to be shortened four times during its existence, while the other was taken up but once, and was in

good condition when the continuously strained one was worn out. Of course a single experiment of that kind would not definitely settle such a matter, but all experience seems to point the same way.—*American Machinist*.

**RESISTANCE IN TUBE PLATES OF BOILER TUBES WITH TAPER ENDS.**—In the minutes of the proceedings of the British Institution of Civil Engineers, there is an interesting record of some experiments which were made in Germany some time ago, with the object of testing the resistance of boiler tubes with taper ends forced into the tube plates. Five wrought-iron tubes were supplied for the purpose, which were forced into wrought-iron plates, bolted to and closing up the ends of a cast-iron pipe. Each tube was strengthened at both ends by a ring brazed on and turned taper on the outside, so that the outer surfaces of the two rings on each tube formed part of the same cone. The joints were made tight against an internal pressure of 15 atmospheres by means of a tube expander. In the first series of experiments the projecting ends of the tubes were not enlarged; in the second they were. The prepared test-piece was placed in the Werder machine in such a manner that at one end pressure was applied to the cast-iron pipe, at the other to the wrought-iron tube. With ends not enlarged, the mean force required to push out the tubes was 15,211.7 pounds; the maximum, 18,739.1 pounds; with enlarged ends the mean resistance was 20,943.7 pounds, showing an increase of 37 per cent. The outside diameter of the smaller end of the tubes tested was about 3.05 inches; this was measured on the taper ring. The diameter and thickness of the actual tubes themselves are not stated.

**CASTOR OIL TO PREVENT FOAMING.**—A correspondent of the *American Mechanic* writes as follows: "I have been troubled very much with the foaming of the water in boilers, especially when taken from creaks and pools. I have tried many ways to remedy the evil, but all the remedies that I could think of and read of failed me at times; but I have found one of late that has proven the best of all. Several months ago I was having trouble with the water, so much so that I could not run the engine. The foreman of the mill said he had used castor oil in a boiler where alkali water was used, and that he thought this would help us out of the trouble. So I put two ounces of the oil in at the check valve, and in three minutes the water was still and clear. So when foaming began again I began with the oil. Generally two ounces would last a day, but at times I would have to use a pint. My plan of handling boilers is to blow out some of the water at night or morning with about 50 pounds of steam, and put the oil in, if foaming begins after starting the engine. I never blow all the water out of a boiler, when hot, if I can avoid it. This boiler is tubular, 44-inch diameter, 14 feet long, and carries from 100 to 120 pounds of steam. Engine 12x20; 190 revolutions."

**A BOILER ILLUMINATED BY ELECTRICITY.**—At the late London exposition of inventions there was shown a working steam boiler, the interior of which was illuminated by electricity. The whole apparatus used for this purpose consists of a little battery outside of the boiler, which is connected with incandescent lights screwed to the interior walls of the steam space above the water level and encased in steam-tight bulbs, while a second wire ends in a leading button outside of the boiler. Strong, double observing glasses are let into a brass rim set into the end wall of the boiler. If the current is closed by pressing the button against the metallic boiler wall, then the incandescent lamps begin to glow and light the interior of the boiler. It is hoped by this means of observing the process of heating water and the production and withdrawal of steam to gain material knowledge and advantages for steam

**HEAT, NOT BLAZE.**—Heat in contact with the shell or flues of boilers is very rapidly dissipated; for instance, if the extraneous air and the products of combustion in the fire-box is assumed to be 2500° F., and the temperature in the chimney of a 20-foot boiler 600° F., and the rate of motion is taken at 22½ feet a second, and it would follow that in passing under through the boiler is about 1½ seconds, they would have parted with 2500°—600°=1900° of heat; so that it will be readily seen that perfect combustion can take place but little if any distance back of the bridge wall. The assumption of 2500° in the fire-box is a very generous one, comparatively few furnaces showing any such results. But a large majority of those who have charge of steam boilers delight in a long blaze, and claim that such a blaze makes steam rapidly, while really there is no better evidence of imperfect combustion.—*Industrial World*.

**CARVING MACHINES**, each of them capable of doing the work of eight to ten men, have been introduced into the Pullman carshops in Illinois as a consequence of the recent strike, and, as claimed, with success. The machines work from a pattern, previously made by hand, which is placed in the center. A "needle" is made to follow all the curves, etc., of the pattern, and chisels on the end of arms at each side make duplicate of the pattern. These machines, the superintendent says, will largely supersede handwork and at the same time insure uniformity.

# SCIENTIFIC PROGRESS.

## Diamonds and Emery Wheels.

At a meeting of the New York Academy of Sciences, held on April 13, 1885, Mr. George F. Kunz, the gem expert, whose illustrated article on American gems in *Harper's Magazine* for December, 1887, attracted much attention, exhibited and described a remarkable diamond regarding which he had previously published a communication in the number of *Science* for May 30, 1884. This diamond was made up of a multiplicity of twinnings, and was of the character called "extreme dureté" by the French. It had been cut into the rude form of a brilliant, and its table had been placed on a diamond-polishing wheel for 100 days. The average circumference of that part of the wheel on which it was placed being about 2½ feet, and the wheel going at the rate of 2800 revolutions per minute, the surface that traveled over the diamond table amounted to over 75,000 miles. At times four and eight pounds were added to the usual 2½ to 3 pounds of the clamp or holder, and for a time 40 pounds extra were added, this last causing the wheel to throw out scintillations for several feet. The diamond fairly plowed the wheel, practically ruining it, so that it required planing before it could be further used. No polish was produced, however, sufficient to give the brilliancy necessary in any diamond gem. These experiments were conducted by Messrs. Tiffany & Co., who were the owners of the diamond.

The stone thus described was kept by Messrs. Tiffany & Co. as a curiosity in their gem cabinet until November, 1887, when it was bought by the Tanite Co. of Stroudsburg, Monroe county, Pa. The solid emery wheels manufactured by this company are all lathe turned, the turning tools being diamond-pointed. The gem in question was put to work in the turning-room of the above establishment, the first solid emery wheel it turned being a coarse, hard wheel 36 inches in diameter and 8 inches thick. In the turning of this wheel and two much smaller ones, the diamond lost 1.32 carat in weight. In the manufacture of Tanite emery wheels the cost of diamonds is an important factor, and it is a striking fact that a gem of such extreme hardness as is indicated by Messrs. Tiffany & Co.'s experiments should wear so rapidly under the action of a Tanite wheel.—*Stroudsburg (Pa.) Jeffersonian*.

## Interesting Facts in Regard to Coal.

In the course of a lecture given at Toynbee Hall, a charitable institution founded for the benefit of the poor inhabitants of the "East End" of London, Prof. Boyd Dawkins, speaking of a "bit of coal," said that, besides the element of carbon, coal had another important constituent in the form of a resinous substance visible in shining patches on any cross-section. To this element, which was composed of the spores of plants allied in nature to the club-mosses of the present day, were due all the blezing properties of the coal; and the extra quantity of gas existing in cannel coal was due to the fact that it possessed a greater proportion of the resinous component.

From an examination of a piece of coal it was possible to picture the vegetation of the carboniferous period; and the forests from which the coal fields were accumulated must be imagined as consisting largely of trees closely akin to club-mosses, but immensely greater in growth, of other kinds of coniferous trees, and of enormous ferns. Every seam of coal was found to rest upon a bed of some other substance, generally shale, traversed in all directions by the roots of plants. This substratum was clearly, therefore, the soil on which the coal plants grew, for all these roots could be identified with the stems of the plants found in the overlying strata. Upon a seam of coal there generally was found to rest a bed of shale or sandstone, which was nothing more than a petrified mudbank or sandbank, and in either case must have been accumulated by the action of water.

The coal seams were, therefore, at one time covered with water, the inundation being accounted for by the dropping from time to time of the surface of growth. Of the time required for accumulation of any one coal seam, the geologist could say absolutely nothing. It was a noticeable fact that the coal-fields of this country existed as a series of isolated basins. How was this to be accounted for? Taking a section of the strata from Manchester to Derby, it was found that at the Pennine range the stretch of coal-measure rocks was interrupted by the intrusion of the lower strata, but resumed on the other side of the mountain chain. As for every seam of coal occurring on one side of the hills there was found an equivalent on the other side, it was to be concluded that the coal seams had been at one time continuous. Convolutions had taken place in clearly defined lines, and one of them could be traced through the south of Ireland and Wales toward the southeast of England. From this fact Prof. Dawkins said that he had no doubt that basins of coal-producing rocks were to be found in the last-mentioned area; and, in fact, an experimental search for one of them was at that time proceeding at Dover.—*English Mechanic*.

**VEGETABLE AND MINERAL COLORINGS.**—So great has been the substitution of colors obtained from coal-tar for vegetable, wood, or

animal dyes, that only two of the vegetable class now retain any great importance—indigo and logwood. Lac dye has been entirely displaced, and the consumption of cochineal has dwindled down to a very small amount. The fallacy of the opinion that coal-tar dyes must necessarily be fugitive and poisonous, and that there could not be produced from them as fine a shade as that obtained from the vegetable dyes, has been abundantly disproved, and the increase in the consumption of the new dye during the last year is found to be more than 33 per cent, this increase taking place quite exclusively in compound colors. Indeed, no fabrics are now dyed in any of the pure colors, and the augmented consumption has taken place in judiciously blending these colors with themselves, or with vegetable dyes, so that there are now some 150 different colors obtained from coal-tar, independent of indigo or any vegetable dyes. The amount of coloring matter derived from a ton of coal is very large, while the dyeing power of the coloring matters due to this source is really immense; thus, the magenta derived from that quantity will dye 500 yards of flannel, the aurine, 120; the vermilion-scarlet, 2560; and the alizarine, 255—Turkey-red cotton cloth.

**THE COAL-TAR SUGAR.**—Our readers generally have heard more or less of that remarkable substance, extracted from coal tar, which is some 300 times sweeter than cane sugar, and many no doubt have been looking forward to the time when this new saccharine material will be introduced into our domestic economy. The *German Sugar Manufacturers' Journal* recently announced that a large establishment for its production is nearly ready for business near Magdeburg in Germany. That journal further states that it is expected that the new sweetening substance will be largely used for mixing with glucose. One part of this substance mixed with 500 parts of glucose will make the latter a sweetening compound equal to the heat cane or beet sugar that can be made. In the meantime, according to the *London Telegraph*, the coal-tar sugar has been manufactured on a small scale and sold in the form of small tablets, which are put up in tiny phials about two inches long, and may be carried in the vest pocket. The tablets or disks are white, four of which will lie upon an English three-penny piece, and are very thin. One of these disks dissolved in a cup of tea will impart a delicious and most excessive sweetness. This sugar is said to be of great value for use by people who have a horror of obesity, which common sugars tend to produce. It is also of value for those who are inclined to gout or rheumatism. It is said to have been administered with good results to the new Emperor of Germany in place of common sugar. Should its use in this case be found to continue with favorable indications, it will prove a most effective advertisement for the new article, and might exert a revolutionary effect upon the great sugar industry of the world.

**COFFEE AS A GERMICIDE.**—Professor Heim has recently, by many and careful experiments, shown that caffeine is death to micro organisms; that infusions of animal matter in coffee may be exposed to the air without gathering mold; that the bacilli of cholera cannot live in coffee, and that under its influence the microbes generated in typhoid and malarial fevers have been long known, but has been attributed to the tonic effects on the nervous system. By Heim's showing, however, results seem to be due to the antiseptical properties of coffee.

**MOONLIGHT EFFECTS ON VEGETABLES.**—The influence of the moon upon vegetation is an interesting problem awaiting solution. A recent writer upon the subject mentions that woodcutters in Cape Colony and in India insist that timber is full of sap and unfit to be cut at full moon. Another observation of lunar influence in Cape Colony is the rapid spoiling of meats and other provisions when exposed to moonlight, though this may be due to the fact that the light serves as a guide to insects.

**ANOTHER NEW EXPLOSIVE.**—Rev. Father Donahue of Charleston, Ill., has discovered a new explosive which he calls laterite. In effect it resembles the Russian lectover, the most effective explosive known to science. He claims that, if anything, it is superior and more deadly. It is put up in fuses and is made from pine gum. He claims that with it gunpowder can be made much more cheaply, and that the new compound will displace gunpowder in time.

**ELECTROLYTIC ALUMINUM.**—L. Senet has devised a new process for obtaining aluminum, as well as copper, silver, etc., by electrolysis. He exposes a saturated solution of sulphate of alumina, separated from a solution of chloride of sodium by a porous vessel, to a current of six or seven volts and four amperes. The double chloride of aluminum and sodium is decomposed and the aluminum is deposited upon the negative electrode.

**A NEW SILVER ALLOY.**—J. Scully of Calcutta has found that the addition to pure silver of but four-thousandths of its weight of his-muth renders it brittle when cooled slowly. When cooled quickly the effect is not so marked, but still sufficient to render it unserviceable for coinage.



## GOOD HEALTH.

## The Desire to Attain Old Age.

The St. Louis *Globe-Democrat* has been publishing a series of articles on old age. We copy the following in relation to the desire for such a consummation, which will be followed next week by another detailing the physical changes of advancing years and the cause of the failure of the mental powers:

It is evident on the slightest observation of our race that old age can be attained by only the smallest minority. This is the rule of every animal race, and man is merely the crowning effort of nature in all the animated creation. It is very evident that this is a conservative process in the long run and calculated for the best interests of mankind. Were all the maimed, the vicious, the imperfect specimens to survive to 90 or 100 years, on an equal footing with the most favored of humanity, too great an opportunity would be afforded for the survival of the those least fitted for the race of life, while the "fittest" would be perpetually overhounded with the care of those least able to meet the exigencies of the "struggle for existence." There is no race of animals or plants the majority of whose members attain adult life, still less advanced age.

Hence the hope of prolonged life has no foundation in analogy. The weak and imperfect must fall early in the strife, else there would be neither room nor support for those which ought to survive. The enormous mortality of children under five years of age, the devastations of the infectious diseases generally, and especially those recognized as epidemics, the waste of life in war and famine, all contribute to the general welfare, whatever may happen to individual sufferers. The increased average length of human life, observed within the past 50 years, offers no hope of death from old age ever becoming the natural and usual termination of the life of men. It is by no means likely that an extension of the ordinary life to 100 or 150 years would add at all to the sum total of happiness—rather the contrary. All who have carefully observed the condition of the aged concur in the opinion that the infirmities of both body and mind, which are accompaniments of greatly prolonged life, are drawbacks of a most serious nature, and calculated to render great age extremely undesirable.

Notwithstanding the discomforts and infirmities of old age, the desire for prolonged existence is almost universal. It seems to be an expression or outgrowth of that instinct of self-preservation that becomes extinct only with long-continued suffering or from the shock of great and repeated disappointments. Like all the animal instincts, that leading to self-preservation is unreasoning. It is as strong in the idiot as in the sage. The instincts are the property of the race and are, in fact, memories that have become organized in the central nervous system, which are transmitted from the ancestry as well defined as are the features of the countenance or the peculiarities of thought and disposition. As may be inferred from this, the instincts are principally useful as conducive to the welfare of the race in which they appear; but they are not always of service to the individual members of that race. The fact that most people desire to reach old age is not a sign that old age would prove of any particular advantage to every man or woman who feels this desire.

The intense desire to prolong the earthly life has led to some remarkable results. The search of the old alchemists for the philosopher's stone that should transmute the baser metals into gold, was varied by the quest for the elixir of life or universal remedy which should cure all diseases and restore the partaker to all the joys of youth. It is quite likely that desire for prolonging life was an incentive to study and research as strong if not stronger than avarice in the lives of these old students of nature. One important consequence of this study was the finding of the science of chemistry, which is at the basis of most modern industries. With chemistry came increased development of all the medical sciences. The end and aim of the modern physician are very like those which actuated his predecessor—the alchemist of the dark ages. He no longer dreams of finding the elixir of life, the universal remedy, or the fountain of perpetual youth. The alleviation of pain, the removal of disease by increasing and supporting the natural powers, and thus, indirectly, prolonging life, are the more important of his objects.

**STUDY AND HYGIENE.**—The question of home study and the amount which should be required is one that is at present receiving a great deal of wholesome attention. There is, however, a physical phase of this subject which demands quite as much attention as its more manifest intellectual ones. It is distressing to see young and growing children carrying, day after day, a heavy pile of books to and from school. Usually this weight rests wholly upon the left arm, and young ladies attending our high and normal schools are frequently obliged to stand, thus overladen, in crowded horse-cars. This daily transportation of piles of books inevitably produces more or less one-sidedness, with one shoulder higher than the other, one hip higher and larger than the other. But worst of all, it is responsible for many cases of curvature of the spine and the

countless evils which accompany it. This tragic fact is sufficient in itself to condemn home study, unless the amount of work can be so modified as to proportionately reduce the burden borne by these young shoulders. Mothers can see with their own eyes, if they will but use them, the deplorable results of the much study, which, in a different sense from Solomon's, is a weariness to the flesh, and should vigorously protest against its exactions. This is one of the many evils of our schools, which the public—that vague, irresponsible body—in other words, the fathers and mothers of our land, will be obliged to take not passive but active cognizance of, and against which they will sooner or later be forced to wage aggressive warfare. The creation of this sort of public sentiment is the only power which can be brought to bear upon committees, trustees, and boards governed either by ignorance or by politics. It is the only remedy which can ever be found for the errors of the system of which so many parents complain, so few lift either voice or finger to combat. Gulliver, in his travels among the Lilliputians, encountered a genius who cherished the idea of building a house by beginning at the chimney. Not one whit less ridiculous is the notion that any moral or mental superstructure can be raised without a sound physical foundation.

**COLOR BLINDNESS A BRAIN AFFECTION.**—Professor Ramsay believes that the particular defect giving rise to color blindness lies, not in the eye itself, but in the brain. Certain persons he points out are incapable of judging which of two musical tones is the higher, even when they are more than an octave apart. Yet, as such persons hear either tone perfectly, the defect is not one of deafness. He accordingly argues that in such persons the brain is at fault, and thence proceeds to the assumption that it may be equally true that the inability to perceive certain colors is not due to a defect in the instrument of sight by the eye, but to the power of interpreting the impressions conveyed to the brain by the optic nerve. If this is the case, the problem is no longer a physical one. It falls among those with which the mental physiologist has to deal.—*The Medical Press.*

**HOPE FOR CONSUMPTIVES.**—Every year brings forth new hopes for consumptive patients, and some eminent men think that the discovery of a remedy for this too common disease is now but a matter of time. Garcin has found that the inhalation of air containing a small amount of hydrofluoric gas has a remarkably good effect on consumptives. Of 100 cases so treated 41 per cent improved and 38 per cent were cured. Hydrofluoric acid kills the bacilli of disease, and as phthisis is caused by the presence of these lower germs of life in the lungs, their destruction removes the cause of the disease; hence, if the patient is not too far gone, it is reasonable to expect an improvement.

## USEFUL INFORMATION.

**TO FILL CRACKS OF WORM-HOLES IN FURNITURE.**—A correspondent of a contemporary recommends sawdust or raspings of hard and soft wood for filling the cracks and worm-holes in old furniture, which he says he learned from the Oriental carpenters. The sawdust is sifted through wire gauze, and each kind kept by itself. He says: "For a crack, a worm-eaten hole or a deep flaw, prepare the proper dust by the admixture of brickdust in flour (also kept ready), of whitening, or ochre, or any required tint. Then take well-cooked glue, and on a bone-plate stir it in slowly while hot, with sufficient powder for your work. Dab the hole or crack with your glue brush, then with a putty knife stir about the mixture on the plate, taking care you have the right color. When sure on this point, take some of the cement on the end of the knife and insert it in the desired place. Then use as much pressure as you possibly can with the blade, and keep smoothing at it. Sprinkle a little of the dry powder on the spot. When thoroughly dry, sandpaper the surface with an old used piece, so as not to abrade the joint. You can then varnish the mending. Where weevil and wood-worms have devoured the furniture, cautiously cut out the part till a sound place be reached. Poison the wood with a solution of sulphate of copper injected into the hollow. Let it dry. Cut an angular piece of same wood from your board, and with a sharp chisel make a suitable aperture for its reception. Fix it with glue. When thoroughly dry, work with carving tools or rasp and glass, scraping till the new bit of work exactly matches the old."

**TO DESTROY CERTAIN TASTES.**—A plant has been discovered in India which possesses the singular property of destroying the taste of sweetness. After chewing the leaves, sugar placed upon the tongue conveys no more sense of sweetness than grains of sand. It also has the property of destroying the power of enjoying a cigar, and even masks the bitter taste of quinine. The peculiar properties of the plant are dependent upon the presence of an acid, which can be dissolved out by alcohol.

**VARIETIES OF COKE.**—The difference of result obtained by heating organic structures from ordinary to high temperature, rapidly or slowly, to expel volatilizable parts, is well known in the difference in the structure of coke produced from ordinary bituminous coals

in gas retorts, and that from the same coal in coke ovens. Gas coke, which is made by rapidly heating the coal, is in the form of a spongy, porous mass, weak in structure, insonorous, easily ignited, and having the appearance of a mass from which bubbles of gaseous matters have escaped. Oven coke, which is made by heating comparatively large bodies of coal gradually and continuously for a long period, is of a close-grained structure, capable of sustaining great pressure or weight, and so compact and dense that it is insonorous. This gas is far more difficult to ignite than the gas coke.

**USE OF SAWMILL REFUSE.**—It is interesting to notice the practice which is followed in Sweden of producing gaseous fuel from sawdust and waste wood from sawmills, one of the prominent steel works (Domnarvet) being reported as depending almost entirely on such fuel made in producers into which are charged sawmill refuse and sawdust. Being as yet untried in this country, notice of the possibility of such a utilization of what is now waste material is made here to show that, should there be any deficiency of mineral fuel, an iron or steel works might be sustained if the cost of producing the gas from wood was not found to be a barrier. The quality of such gas is satisfactory, but the condensers, which are necessary on account of the percentage of water in the wood, make the plant more expensive to construct and maintain than producers using mineral fuel. Time has not permitted a thorough consideration of such application in connection with an iron and steel industry at Duluth, but there is no question as to its practicability. The problem to be decided will be rather one of the comparative economy depending upon gas made from mineral fuel or gas produced from vegetable fuel, and the possibilities of a continued supply of material for the producers. For the present such supply appears evident from the large deposits of sawdust clogging the water-courses, and the great heaps of sawmill refuse which are constantly kept burning.—*English Paper.*

**GREEN AND DRY LUMBER.**—The extraordinary demand for lumber is bringing out a great variety of drying processes, covering cold air and hot-air methods. It pays to expel moisture in order to save freight. Slow seasoning is out of date. Improved methods in the preparation of lumber are appearing everywhere and the better prices realized are stimulating the demand for driers. A discussion is going the rounds of the press as to the relative strength of wet and dry timber. There is not much made out of the discussion. Some kinds of timber are stronger when dry, while other kinds are stronger when wet or green. It is safe to say that all woods are harder and less pliable to bend when dry than when wet or green. But most hard woods when wet will possess more tensile strength than when dry. Timber thoroughly seasoned is more brittle than when green, and with the necessary force will break square off, while the same timber green would stand about the same pressure by bending more or less without breaking. Take a hickory sapling that it is almost impossible to break in its green state, although it may bend double, and thoroughly dry it, and you may easily break it almost "square off," as the boys say. So with almost any kind of timber. Drying makes it stiffer, more unyielding, but in very few instances stronger.

**CRIMSON-STAINED WOOD.**—The following is a crimson stain that is frequently used for decorative woods for musical instruments: Ground Brazil wood, one pound; water, three quarts; cochineal, half an ounce; boil the Brazil wood with water an hour, strain, add the cochineal, boil gently for half an hour, when it will be fit for use. This is first applied, and then the varnish, consisting of rectified spirits of wine, half a gallon, six ounces of gum sandarac, three ounces of gum mastic, and half a pint of turpentine varnish; put the above into a tin can by the stove, frequently shaking till well dissolved; strain and keep for use. If it is harder than is wished, thin with more turpentine varnish.

**ELECTRO DEPOSITED STEAM PIPES.**—By a method, practiced in England, for making copper steam pipes, the copper is electrically deposited in the proper form, doing away entirely with brazing. This has been done before, but the strength of the copper has been destroyed. This difficulty is said to have been obviated and copper pipes of great strength obtained.

**YELLOW OR ORANGE STAIN** for wood is one of the most sought for in ornamental or cabinet work. A beautiful result is reached by diluting 1.2 ounces of finely powdered turmeric for several days in 17.5 ounces 80-per-cent alcohol, and then straining through a cloth. This solution is applied to the articles to be stained.

The following are the items in the river and harbor appropriation bill for California: Humboldt, \$150,000; Oakland, \$175,000; Wilmington, \$90,000; Redwood, \$7400; the Mokelumne, \$2000; San Joaquin, \$25,000; San Luis, \$25,000; Sacramento and Feather, \$20,000; San Diego, \$1000; Napa, \$7500; Petaluma, \$2000.

**NIGHT AND DAY GROWTH.**—Fruit trees acquire most of their growth by night. The fruit of the cherry laurel, for instance, increases at the rate of 90 per cent at night and only 10 per cent by day, while apples increase 80 per cent at night and 20 per cent in the daytime.

## ENGINEERING NOTES.

**RAPID EXTENSION OF CABLE ROADS.**—A paper was recently read before the Western Society of Engineers at Chicago, by D. J. Miller, on the subject of Traction Rope Railways. This is a matter which is now attracting great attention in every progressive community, so that any facts concerning the cost of building, etc., of such lines are of great interest. Mr. Miller says: "Four years ago there were in the United States 36½ miles of cable road in operation and under construction. January 1, 1887, there were 152 miles in operation and under construction. It is estimated that during the present year at least 100 miles will be added to the above figure. While some of the latter roads contain valuable improvements, there are others the designs and workmanship of which could not well be worse. Within the last year or two many unscrupulous speculators have manifested a decided interest and activity in cable work, attempting, especially of late, to palm off on the public what they are pleased to designate as some particular system of cable traction, the so-called system in reality containing not one element requisite to a good road; but this method of propulsion has grown in popularity so rapidly that many capitalists willingly invest in cable roads regardless of their merits or demerits."

**CONNECTING THE MISSISSIPPI WITH THE LAKES.**—It is said that the canal project now being carried out to connect the Mississippi with the great lakes is already well-nigh completion. The improvement of the Illinois river from its mouth to La Salle is about completed—a distance of 225 miles—leaving not more than 80 or 85 miles more to complete the work to the lake at or near Chicago. The improvement thus far consists of a system of locks and dams that will provide a navigable channelway of seven feet depth at low water for all classes of Mississippi river steamboats, and for such gunboats and war-vessels as it may be found expedient or necessary to transfer between the gulf and the lakes in case a vigorous and proper defense of our country should ever require this to be done. The same system of improvement will be continued to Joliet, a little more than half the remaining distance, from which point it will be continued along the most feasible route, which is yet to be decided upon. The plans and estimates, based upon accurate surveys, has been prepared by direction of Congress for continuing the improvement as far as Joliet. From this point to the lake the surveys are yet to be provided for.

**ANOTHER STUPENDOUS ENGINEERING SCHEME.** This is, in very fact, an age of stupendous schemes, and the railway comes in for its due share. Prominent among these, in so far, at least, as the features of daring and magnitude are concerned, is the proposal to build a line of railway to connect Minneapolis and St. Paul with Pekin, China and Irkutsk, Russia, via Victoria, B. C., and Cape Prince of Wales, Behring strait, involving among other astonishing things the bridging of Behring strait, which at the point suggested in this scheme is only 35 miles wide and from 20 to 25 fathoms deep. The distance from Victoria to Cape Prince of Wales is about 1100 miles. It is not stated who the moving spirits in this stupendous enterprise are further than that they are western men, which leaves no doubt that in the matter of enterprise and daring at least there will be nothing lacking.

**A STEAMER WITH A PROPELLER FORE AND AFT.** It is said that a steam propeller, with screws fore and aft, is to be built for the Hoboken Land and Improvement Co., to be used as a ferryboat on the North river. In propellers the engines can go below deck, thus saving the space occupied by the paddle-boxes. The propeller is faster and can make better headway against floating ice. There is, besides, less danger of injury from drifting logs. The new boat will be 200 feet long and 37 feet beam, with powerful engines, and cost in the neighborhood of \$100,000. If she proves to be a success others are to be built, and the old ferryboats will be altered to the new model.

**THE PROPOSED ENGLISH CHANNEL BRIDGE.**—Detail estimates for a bridge over the English channel have been laid before the Minister for Public Works by Vice-Admiral Cloué, of the French navy, in the hope of obtaining a government subvention. The sanguine promoters think this scheme will meet with less opposition from military men than the tunnel project. The cost is estimated at \$220,000,000, on which a net profit of \$20,000,000 per annum is expected.

**CONNECTING LAKES ERIE AND MICHIGAN.**—A number of Western capitalists have united in the project of connecting Lakes Michigan and Erie by a ship canal 40 miles long, across a narrow neck of the upper Michigan peninsula. The distance by water between the two points is 300 miles, and forms a very difficult and dangerous piece of navigation. The estimated cost of the canal is \$5,000,000.

**THE TRANS-CASPIAN RUSSIAN RAILWAY** has reached "Chargui," or Chargo, as it is spelled on the map. This point brings the Russian locomotive within 240 miles of Herat and within 450 miles of the nearest practicable approach to the British Punjab. Where is this road to end? Perhaps on the Arabian gulf. Who knows?



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**SUTTER CREEK.**—Cor. Amador Ledger, March 31: Since my last writing a big strike has been made in the Wildman mine. Your correspondent was taken all through the mine this week. Through the courtesy of Mr. Tregloan, the superintendent, and the foreman, Mr. Smithernum, he was shown every level in the mine. On reaching the 300-foot level, we came to a ledge about 15 feet wide, of good paying ore. At the 400-foot level we found a ledge well defined, about 5 feet thick, of good rock, and on going to the bottom, the 500—where they have made the strike—about 300 feet from the shaft the ledge is about 5 feet thick, and the rock will go at least \$25 per ton. It must be remembered that the shaft is located on the extreme northern boundary of the claim, and the rock spoken of is all going south, so that the indications are excellent for a fine-paying mine for many years. The owners and managers feel jubilant over the strike.

**PLYMOUTH CONSOLIDATED.**—Amador Ledger, March 31: An effort is to be made to work the Pacific mine, notwithstanding the fire. The Empire shaft being the highest by a few feet, the smoke and gases generated by the fire find vent through that opening. A plan has been suggested, and will probably be carried out, to increase the draft by building a chimney 20 or 25 feet high over the Empire shaft. By this means, with the assistance of a fan in the Pacific shaft operated at the level of the fire, it is hoped to leave the latter mine sufficiently free from smoke to enable it to be worked without inconvenience or danger. There is great objection to extinguishing the fire by flooding, on account of great damage to the works likely to result from such a course. Flooding is not likely to be tried, except as a last resort. It might be practicable to extinguish the fire from the Pacific shaft, were it not for the fact that as the timbers are devoured by the flames, the ground caves, shutting off approach.

**MISCELLANEOUS.**—The flow of water in the Amador gold mine, reported in our last, has so far subsided as to permit of the resumption of work in the drifts. Both east and west drifts are again being worked, and the mine is now giving employment to 20 men. The North Star shaft is down 320 feet, and is said to be in ledge formation. W. G. Anderson is driving the tunnel on the New York claim, three miles southwest of Jackson. It is in over 300 feet, and has 50 feet further to go to reach the point where it is expected to strike the ledge.

## Calaveras.

**ANGELS.**—Echo, March 28: The new hoisting machinery is being rapidly placed in position at the Utica. It is rumored that the Tozier has shut down for a few weeks. We were shown some rock from the Uno mine, the property of J. P. Sylvester & Co., and it looks well, averaging \$15 a ton. A fine concentrator with the Marse belt has recently been added to the Hardy & McCreight's mill at Albany Flat. Rumor has it that more mining property in this section will soon change hands. The more the merrier.

## El Dorado.

**MINING PURCHASE.**—Georgetown Gazette, March 29: The Walker Bros., through their agent, J. H. Morton, have bought the mine owned by Chas. Forti and John Austin and also the Wall Street mine from G. H. Barklage. Both of these mines adjoin the Alpine mine. This company bought the Alpine about three years ago, and, by their perseverance and the good management of Supt. Morton, have developed a very promising mine. They are now erecting a ten-stamp mill, the stamps to weigh 1000 pounds each. We hear that the site for the mill is being graded large enough to give room for 30 more stamps, which will be added as the mine is opened up. As this mine is only about 2½ miles from Georgetown, it is an enterprise of much importance to our citizens, and is only another demonstration of what capital and well-directed energy will accomplish on this divide.

**GRAVEL.**—Placerville Observer, April 3: Wiley Sexton and Frank Pincini are taking out 14 carloads a week of gravel that averages about \$10 to the carload. They work to great advantage for want of proper opening to their gravel channel, their present tunnel being too high. They handle all the gravel three times before they get it on the dump. Mr. McDonald, superintendent of the Mount Pleasant mine, at Grizzly flat, has arranged with A. McAfee to sink the shaft on the Ohio mine 30 feet south of the Mount Pleasant line, and drift from that shaft north to their own ground. Several men have been set to work, and favorable results are expected, as a large vein of pay ore is known to exist there.

## Fresno.

**GRUB GULCH.**—Cor. Fresno Republican, March 31: Grub Gulch is a mining camp in the foothills, about 70 miles north of Fresno city, and 14 miles from Raymond, the nearest railroad point. It is situated in a beautiful gulch on the southwest slope of the Sierra Nevada mountains, and the main highway leading from the great San Joaquin valley to the Yosemite, passes through the center of this camp. Among the principal mines now in operation are the Josephine, Gambella, Knob Hill, Enterprise, Red River, Antelope and many others. The Josephine has a shaft over 400 feet deep, and employs about 25 miners, furnishing ore enough to keep a 20-stamp mill running day and night. The Knob Hill was purchased lately by a stock company for \$10,000, and a 25-stamp mill will soon be erected to work its ore. The Red River and Antelope mines have also been purchased by stock companies, who intend to erect a mill. The camp is alive with experienced prospectors, and new leads of immense value are being discovered every few days. The climate of this locality is quite delightful, and at this season of the year the thermometer averages about 65 degrees.

**A PROMISING PROPERTY.**—Fresno Expositor, March 28: D. H. Jackson of Oakland is largely interested in quartz mines about 28 miles from Fresno in a northerly direction, on the San Joaquin river, and about 4 miles south of Hildreth. Mr. Jackson invested in the mining properties in July last, and since that time has expended considerable

in money and much in labor in developing what he has good reason to believe will prove remunerative mining property. The principal ledges, or those on which the most work has been done, are the Fleming, Gold King and San Joaquin. In addition to these he has 12 other localities undeveloped. The Fleming has over 1000 feet of shafts, drifts and winzes, and is one of the best developed mines in Fresno county. The vein was tapped by a tunnel at a depth of 145 feet from the surface, and two drifts forming a level were run a distance of 556 feet. Two winzes were sunk below this level, one 75 feet, the other 30 feet, and four upraises were made from this level to the surface. The ledge, which runs in granite, is from 1 to 4 feet in width, averaging 2½ feet. The ore is free milling, and was worked by arrastra before the property passed into the hands of the present owner, and it paid from \$26 to \$94 per ton, this being selected ore. Mr. Jackson considers the Fleming good for an average yield of \$15 per ton by milling. The ore can be mined and milled for \$2.25 per ton. Twelve men are now employed in the Fleming mine, which force will be increased to 60 or 70 on the completion of a ten-stamp mill, to be erected this spring, the work to begin by the 1st of May next.

**THE GOLD KING** is less developed than the Fleming, but has been sufficiently prospected to satisfy the owner that he has in it a valuable gold mine. This mine will be tapped by a tunnel 500 feet in length, which is now in 425 feet. On the top of the hill, toward which the tunnel is now being run, three shafts have been sunk on the ledge, respectively 45, 50 and 95 feet, showing good ore, similar to the Fleming, along the vein. Seven miners are employed in the Gold King.

**THE SAN JOAQUIN**, a similar formation to the Fleming and Gold King, has a number of shafts sunk on it, ranging from 10 to 85 feet deep, and the ledge at all the points reached shows well in free gold. The ore contains about half of one per cent in sulphurets, in the working of which concentrators will be used.

## Inyo.

**PANAMINT BULLION.**—Index, March 28: A silver bar 191 pounds in weight was expressed to San Francisco from Independence last week. It had been turned over to the men by the company in Panamint, and while not sufficient to pay them in full, they say it is a whole lot better than nothing.

**REFITTED.**—Inyo Register, March 30: Some good ore is being taken out of an extension of the Brauerstein mine, owned by Doc. Graham and others. It is situated in Piute canyon. The Casey mill is being refitted preparatory for a run. The cold weather did a little damage.

**DEATH VALLEY.**—Deputy Assessor Melone furnishes the following in regard to the southeastern portion of Inyo: "Coleman's borax works have an inexhaustible supply to draw upon. They have 57 crystallizing tanks holding 1800 gallons each, and 8 receiving tanks, 2000 gallons each. The borax remains in the crystallizers from 10 to 14 days, when it is ready for sacking. Five teams of 18 animals each transport the product to Mojave, 160 miles away, the trip taking 20 days. At Panamint the boys were on a strike for their pay. Supt. Fairman turned over two bars of bullion as part payment, and secured them for the balance with 30 flasks of quicksilver—amply sufficient to cover all due them. They have shipped the bullion."

## Nevada.

**CHANGED HANDS.**—Grass Valley Tidings, April 3: Within the last day or two, two of the most indefatigable, moneyed and successful mining men on the coast have become largely interested in a Grass Valley mine of promise and intend to immediately and energetically advance developments. The property purchased is known as the Peabody mine, situated on the west slope of Gold Hill—a locality from which millions of dollars in gold have been extracted. The purchasers are Alf. Tregidgo, one of the owners of the Washington and Bluebell mines, of Washington district, this county, and his partner, Baron Von Schroeder of San Francisco. These gentlemen have secured a controlling interest in the property, paying quite a handsome sum therefor. The transfer was made last Saturday, through Weisshein Bros. & Co. Adequate hoisting and pumping works and a 20-stamp mill are to be placed on the mine, the work to be initiated very soon. Good prospects for success are afforded by the Peabody, and that such end may be achieved and the new operators thereby encouraged to launch into other ventures of this nature, will be the earnest wish of everybody on being apprised through these columns of the transfer. A pleasing feature of the deal is that one of our persistent prospectors—one who has spent every cent he could rake and scrape for half a lifetime in unsuccessful ventures—is enriched by several thousand dollars.

**GOOD ORE.**—Saturday last a nine-inch ledge was uncovered in a north drift of the Pittsburg mine at Deadman's Flat—in new ground and 40 feet from surface. The quartz is well charged with minerals and shows gold. Expert miners are of the opinion that it will return from \$80 to \$100 to the ton. The shaft is being cleaned out and other work done, preparatory to an inspection shortly by the San Francisco capitalists who at the instance of Charles E. Clinch have become interested in the property and propose to spend some money on it. The W. Y. O. D. Co. are crushing at Larimer's mill, of which they have a lease. Yesterday a partial cleanup was made and yielded handsomely. The mill will be kept busy for 10 or 12 days yet.

**UP-COUNTRY MINES.**—Tidings, March 30: A year ago Alf. Tregidgo and partner, Baron Von Schroeder of San Francisco, purchased the Bluebell mine of Washington district, agreeing to pay for the property on or before the first of last month. This they have done, in addition to making extensive improvements, with money extracted from the mine. Now they have an 8-foot ledge which yields from \$10,000 to \$15,000 a month, from ore reduced in a 10-stamp mill. Mr. Tregidgo and partner are owners of the Washington mine, which is also paying satisfactorily. On the two properties they have expended \$100,000 and value them at \$500,000. There is two years' ore in sight. The Bluebell is an extension of the Eagle Bird. All the mines in Washington district are doing well, the Yuba never looking better.

**THE DELHI MINE.**—Grass Valley Union, March 30: County Surveyor Urey, who has visited the Delhi mine this week, says that remarkably rich ore

is being taken out, nearly every piece showing gold, and plenty of them showing rich streaks of it. The pay shoot has been found from the surface to the depth of 600 feet, which is the level of the lowest tunnel, and the pay shoot on the dip of the vein is over 200 feet in length. There is no doubt that the vein carries its rich ore to a deeper depth than is given by the tunnel, and no one can foresee as to the time when the treasures of the mine will become exhausted.

**PENNSYLVANIA.**—Grass Valley Union, March 29: A crushing of ore from the Pennsylvania mine is being worked at the Crown Point mill, and the appearance of the plates indicates that a good cleanup will be made. The north drift in the Pennsylvania is yet on a good-sized vein of pay ore.

## Placer.

**FOREST HILL DIVIDE.**—Cor. Placer Argus, March 31: The Gray Eagle mine which is prospecting our deep gravel channel on such an extensive scale, is the center of attraction at present. Their shaft is now down 240 feet and no bedrock yet in sight. By a comparison of the rich gravel recently found at the Dardanelles and that through which the Gray Eagle is now passing, no perceptible difference can be seen, both having the same character of formation peculiar to the ancient Lost River of the Forest Hill divide. Supt. T. G. Durning came from the Bay last Friday, and according to an arrangement with Mr. R. L. Dunn, C. E. and U. S. D. M. S. of Auburn, who came up here on Monday, the locating of a tunnel site for the Gray Eagle Co. was the order of the week. It was ascertained, we learn, that by running a tunnel 2125 feet they could attain a depth of 322 feet beneath the present location of their works. This is believed by all to be a sufficient depth to work the entire lower portion of the divide, including the rich placers of Todds valley and vicinity. It was discovered that the site of the proposed new tunnel was not on the company's ground, but was a part of the public domain; it was therefore immediately located, thereby adding 55 acres to their already valuable property. Mr. Durning also located the Owl creek canyon for 3000 feet below the tunnel site, giving them a sufficient length of sluices to thoroughly wash their gravel. Mr. Bouglis has arrived from Paris, and the syndicate of French capitalists which he represents will shortly commence operations on the Spring Garden mine and adjoining properties which they recently purchased in this district.

**LONG TUNNEL.**—Placer Herald, March 31: A. Rodgers, superintendent of the Dam claim, located just above the Hidden Treasure, was in town this week. Mr. Rodgers says their tunnel is in over 4000 feet. They have run through a lower channel running across the channel they are working. His company employs 16 men. The claim is paying comfortable dividends. According to Mr. Rodgers the Red Point has the best equipped tunnel in the county. It is double-tracked and perfectly dry. The company employs 38 men. The mine is paying well. The Hidden Treasure is in better condition than ever and is paying very well. Mr. Rodgers anticipates busy times on the divide this summer.

## Plumas.

**VARIOUS MINES.**—Plumas National, March 30: Rich ground has again been struck in the Buckeye claim at Sawpit. The pay lead was lost for a time, but under the management of August Holtz it is again paying about \$12 to the man, with good indications that there is plenty of ground of that kind. John Kiefer and W. Reece of Washington Hill are busy at work, with good success. Thomas Lawrence has about finished his contract of running a tunnel in the Thomas claims on Poorman's creek. Sam Galbraith and Taylor Hill have gone to work on the Orr claim, cleaning bedrock. Bell & Co. have struck good pay in a shaft near Newtown, but owing to the melting snow they are not at work at present. McDonald & Co.'s claim on Mill creek is a regular paying one. Good wages for every day's work done. The Bunker Hill at the head of Hopkins' creek is immensely rich. One of the men picked up about \$80 in slugs last week while cleaning bedrock in the tunnel. Twenty men are employed, and it is without doubt the best drift mine in the county. Work will be commenced on the King Solomon mine as soon as the snow will permit. C. W. Smith & Co. at Spring Garden are busy at work. They struck a lead of lamper eels a few days ago, and believe that in a short time they will find good diggings. Bennett & Morton have been making good wages cleaning up the cuts in the Orr claim. A. E. Leavitt has struck good-looking gravel in his claim at Elizabethtown, and expects to be in good pay in a short time. This promises to be a dry year. There is not enough water to run a hydraulic claim, even if the owners were so inclined. Jake Ehrickson has his tunnel in 800 feet on the O'Brien claims, on Waponaie, and is doing well, with pay grit in sight to last for years. There is a large body of gravel, blue as indigo. The Murdoch Bros. are about 1000 feet further up the creek. Their tunnel is in about 300 feet, and they have an immense dump, full of pay gravel, which will be washed as soon as there is sufficient water. They have washed enough to know that they will be paid for their winter's work. Gus Kurtz and John Detman are doing well on Rock creek. The gravel pays good wages, and in working it they have struck a four-foot ledge that prospects well, and will, without doubt, pay for working. The Plumas Eureka mine is looking better than for some time, with ore enough in sight to keep 60 stamps running for years. The Consignee mine, near Cromberg, has its shaft down 360 feet and struck water last week. There is about 75 feet of water. Work is stopped for the present. The Pittsburg Co., on the head of Poplar creek, has graded a mill-site, and will put up a mill as soon as the roads will permit of getting in machinery. Frank and Will Richards have started work in Burton's gulch, near Silver creek. This is a famous gulch for its richness in the past, and if the boys can strike the channel that fed it, they have a fortune. It is reported that a very rich ledge has been struck south of Plumas Eureka, by a miner called Wild Chris. There has been some of the rock assayed, which runs from \$9 to \$1000 per ton.

**PROSPECTING BEING DONE.**—Greenville Bulletin, March 30: From Supervisor Knickrem, who was in Greenville from Mohawk on Monday, we learn that that section of country is in a very prosperous condition. The Eureka mine is understood to be enjoying a degree of prosperity greater in extent than for many years past. The large 60-stamp mill

is kept busy all the time on high-grade ore, which is taken from a recent development whose extent and quality absolutely guarantees a large yield for many years to come. The present yield is about \$40,000 per month. Of necessity, a large force of men is required to operate a mine like this. At present, about 250 men are employed by the company directly, which, as it pays good wages, is able to retain experienced and competent miners. These are deemed the most profitable class to employ. The wages paid are from \$50 to \$55 per month, the company, of course, boarding the men in addition thereto. All hands are paid monthly at least, and semi-monthly if they desire it. Married men are permitted to board at home, and they are allowed \$15 per month for so doing. Under the immediate superintendence of John Hosking, who has occupied that position for years, work is carried on in a systematic and large scale. An immense quantity of wood and timbers is consumed in and about the mine. All of this is furnished by John Nevil, who employs a large force of men and stock to do the work. He has had the contract for years, which, during the coming season, will approximate \$50,000, it is estimated. The company has sent to England for a large pump to use in a shaft, which is being sunk below the Eureka tunnel, the lowest in the mine. It appears to be the intention of the management to prospect the ore bodies below any of the present and past works. If the developments justify, a lower and lengthy tunnel will probably be run to tap these ore bodies which have proven so rich above.

**OTHER MINES.**—On the same range as that of which the Eureka mine is a part, toward Poplar Valley, two Pittsburg companies are prospecting, one for gravel and the other for quartz. The latter has a good prospect. The ledge was reached last summer. The Consignee Gold Gravel Mining Co., at the mouth of Jimson creek, has been prospecting during the past ten years. J. C. Knickrem is the present superintendent. In search of the channel, a tunnel was run 2200 feet. About 400 feet from the mouth of that tunnel, a shaft was sunk 370 feet deep, encountering a large volume of water, indicating that an extensive channel has been reached, which the company proposes to tap with a tunnel 2000 feet long, from the river. The Valentine ledge is situated in the upper end of Mohawk Valley, near McLeer's place. It is 27 feet wide and consists of decomposed quartz, which is very rich in places. With a large mill on it, there is no doubt that it would pay large dividends. A Reno company own and operate an extension of the Valentine. Willoughby, Jones, Dolly and others are interested in a quartz mine in Gold Valley. On top they have good prospects. They are now running a tunnel to strike the vein 300 feet deep, and have only 40 feet more to run.

## Shasta.

**MIDDLE CREEK.**—Cor. Shasta Courier, March 31: Scheerer & Radler are busy pumping water out of the Tellurium. Frickey & Connor, of the Castle Peak mine, are doing some good work on said mine. They are now in about 90 feet, and are taking some good ore therefrom. P. Donahue is at work on the Hope, which also shows up pretty well.

## Sierra.

**ALLEGHANY.**—Mountain Messenger, March 31: The main tunnel of the Union drift company is in 700 feet, within 250 feet of the lead. The Union is owned by Hon. G. G. Clough, Mrs. Jas. Rowell and the Sager Bros. Rainbow Company are working two men on their new, or second ledge, lately discovered. The ore appears well. Buckeye and Tightner Companies are taking out pay gravel. Charles Brainerd and H. H. Brown are running the "Wobler," better known as Forbes' crusher, at the Smith ledge, working outside ore. John Booth, Jas. Clinton and Martin Ellis are working the Highland & Masonic ground through the Excelsior and Eureka tunnel.

**BONDED.**—Cor. Mountain Messenger, March 31: I have been informed that the Empire mine, in Gold valley, has been bonded to the Sierra Buttes M. Co. Five men have gone over to take possession, and to go to work, and more will be sent over in a few days.

## Tuolumne.

**MACHINERY.**—Union Democrat, March 31: Mr. Procter Scott of the Black Oak mine goes to San Francisco Monday, to make arrangements for machinery for the new hoisting works and also to purchase a larger engine.

**MILL.**—Mr. W. N. Harris of Jamestown was in town this week. He will start the Little Gem mill soon. This mine yielded \$100,000 several years ago, and general mining opinion sustains the idea that its future may equal if not excel its past.

**GILSON AND PLATT.**—The company running the Gilson and Platt mine came up Tuesday from San Francisco, and Thursday proceeded to the property for examination. The president and secretary reported the works in fine condition and the mine itself in good ore, with a flattering future before it.

**EAGLE.**—Dr. Tibbits & Co. of Columbia have opened the Eagle mine which is about 12 miles northeast from there; we are told that a splendid chute has been developed. The mines in that locality need mills and appliances very much, as the new mill of Thomas Goodwin on the Stanislaus river is the only reduction process in that locality.

**NEW ALBANY.**—From Mr. Kirke, who was in Sonora this week, it is learned that the New Albany mine is making a record for itself far above anything heretofore prophesied by mining engineers. Those intelligent and enterprising young men, Messrs. Long and Kirke, have, in the course of several weeks, taken out over 200 tons of ore, and they are now running the New Albany mill on the quartz, day and night. It is estimated by competent mining experts, who have made careful estimates, that there is at present enough ore in sight to keep a 20-stamp mill in operation for two years, and that taken as a whole, the quartz will average at least \$10 per ton. The present expenses of getting the quartz out and crushing will not exceed \$1.50 per ton, and even future operations will not exceed an expense of \$2 per ton. The Tuolumne river affords free water all the year.

**STRUCK RICH ORE.**—Tuolumne Independent, March 31: Tibbits & Co. have struck rich ore in their Eagle quartz mine, at Eagle creek, about three-fourths of a mile below the Philadelphia Diggings, above Columbia. The vein in the 200-foot tunnel, at about 80 feet below the surface, shows two feet in



width and very rich in free gold. It is the intention to put up a mill shortly.

## NEVADA.

## Washoe District.

KEYES.—Virginia Enterprise, March 31: Drifting south on the 240 level. The face of the drift shows a number of strata of rich ore, assays from which, during the week, have yielded from \$175 to \$400 per ton. New strata are making on the hanging-wall of the vein continually, showing by their course that all will unite at a point further south.

HALE AND NORCROSS.—From the south drift, 400 level, are stopping ore of good quality. On the 700 level all the stopes are looking well and yielding the usual quantity of excellent ore. During the week have hoisted 1749 tons of ore and shipped to the Nevada and Mexican mills 1580 tons; average battery samples of the same, \$36 per ton. Have bullion on hand and previously shipped this month amounting to \$118,000.

OCCIDENTAL.—In the south drift of No. 5 tunnel, 50 feet from No. 1 upraise, the west crosscut has been extended 12 feet; total, 21 feet. The north drift at the top of No. 2 upraise has been extended 12 feet; total, 31 feet. In the lower tunnel, 150 feet south of the north incline winze, the south drift has been extended 8 feet; total, 46 feet. Extracted 35 tons of fair-grade milling ore.

SAVAGE.—On the 500 level the new working station is completed, and will start the main west drift the latter part of this week. Are extracting ore from the several levels between the 400 and 900 stations, about 60 tons per day, which is being reduced at the Rock Point mill. The balance is accumulating in the ore dumps and in the mine awaiting milling facilities.

BEST AND BELCHER.—On the 425 level upraise No. 1 has been carried up 30 feet; total height above track floor, 150 feet. The formation is quartz, showing value by assay. A work has been suspended at this point. Upraise No. 2 on this level, near the north line, has been carried up from the track floor 30 feet. This raise is wholly in quartz, giving low assays.

CROWN POINT.—The 500 level east crosscut is in 193 feet, having advanced 23 feet since last report. The last 10 feet has been in clay and quartz, yielding fair assays. The 400 level winze was down 60 feet yesterday morning, having improved as depth was attained. They are still following the claywall, and the bottom of the winze is in very good ore.

CHOLLAR.—North drift No. 1, 550 level, is in 303 feet. Average assays had from this drift the past week were from \$25 to \$30 per ton. The west drift from the north drift on the 450 level is now in 78 feet in quartz of low grade. Have struck some very fair ore in the northwest drift on the 650 level, 480 feet north of the Chollar shaft.

HAYWOOD.—Are now working 16 men in the mine. The drift from the bottom of the winze in the deepest workings of the mine has reached the hanging-wall and shows the ledge to be 34 feet wide at that point, which is 270 feet from the tunnel level. Are now drifting in the ore body.

ALTA.—Are upraising on the Keystone vein on the 725 level, and are sinking the shaft to meet this upraise. The shaft is down 72 feet and the upraise is up 200 feet. Drifting south on the 825 level and upraising in ore on the 1150.

BELCHER.—The 500 level east crosscut is now in 193 feet, having advanced 23 feet during the week. The last 10 feet was in clay and quartz, yielding fair assays. The face is now in a clay which pitches east, and is running north of east.

ALPHA AND EXCHEQUER.—Are working on the 422 and 222 levels of Exchequer, and on the 382 level of Alpha. Are chambering for a winze 100 feet north of the Alpha shaft, where there is a good prospect for ore.

CHALLENGE.—The joint Jacket-Challenge north drift on the 1000 level is in 147 feet, 61 feet having been added during the week. This drift is now within 45 feet of the Jacket north line.

BULLION.—The steam engine to hoist from the winze on the 500 level has arrived and been put in place, and work commenced in the winze with steam-power.

BALTIMORE.—Are in the vein at two points on the 350 level. The water is being handled from the northwest drift, and are prosecuting the work in the north drift.

ANDES.—Drifting a little north of east on the 350 level, and north on the 240. This upper drift has some good quartz coming in.

IOWA.—The McBee tunnel has been advanced 10 feet during the week, putting through some favorable-looking quartz and clay seams.

GOULD AND CURRY.—Have extracted during the week 150 tons of fair-grade milling ore, which has been stored in drifts in the mine.

CONFIDENCE.—Are now shipping 150 tons of ore daily to the Brunswick mill, of an average value as per pulp samples of \$38.97 per ton.

WEST CON. CAL.-VA.—Making favorable progress in sinking the shaft, which has just entered the vein. The material assays moderately.

SEGREGATED BELCHER.—The south lateral drift is now in 266 feet, having advanced 16 feet during the week.

YELLOW JACKET.—Are shipping 100 tons of white rock (gold ore) daily to the Santiago mill.

POTOSI.—The south drift on the 550 level is in 341 feet. The face is in quartz, giving low assays.

LADY WASHINGTON.—Upraising on the 725 level, and are now up about 200 feet.

## Central District.

RICH ORE.—Silver State, March 30: Charley Wright and Nicky Gill are mining the Golden Age lead, and are extracting exceedingly rich ore, some of which is worth a dollar a pound. We hope they will find a bonanza, so that Charley can run for United States Senator and Colonel Gill for Congressman.

## Union District.

LOOKING WELL.—Belmont Courier, March 28: The mines of Shamrock canyon, Union district, Nye county, are looking well and producing ore of sufficient richness to pay for shipment and reduction and then leave a handsome margin of profit for the extractors. Ores of gold, silver, copper and

antimony abound in this district. Capital is wanted to open and work these bodies of ore. The mines of Union district will pay dividends as soon as they are understandingly handled by parties who have sufficient money to work them below the grass roots.

## Eureka District.

ORE SHIPMENTS.—Eureka Sentinel, March 31: During the past week ore shipments were made from the mines of the district as follows: To the Eureka Con.—Jackson mine, 60 tons; Silver Lick, 2 tons; Rescue mine, 16 tons; Marguerite, 45 tons, and Gen. Lee, 3 tons. To the Richmond—Bullwhacker mine, 20 tons; Jackson, 33 tons; Gen. Lee, 1½ tons; Williamsburg, 6 tons.

TO START UP.—It is a sure thing that both the Richmond and Eureka Con. will start up their furnaces as soon as the roads are in condition to haul ore over them.

## Hawthorne District.

GOLD BAR.—Esmeralda News, March 31: D. Tobino, the owner, was out to take a view of his Gold Bar mine. He has but two men engaged in working the claim, although in time past he has had his mine considerably opened. A few days ago A. Martinez cut a vein of very rich ore on the claim, which promises to be another Panlico. Now that the claim is known to be very rich there is a dispute about it which may develop into a lawsuit.

PANLICO MINE.—S. A. Knapp, Jr., brought one sack of ore weighing 135 pounds from the Panlico last Tuesday that is valued at \$10,000. He has six sacks from the same mine worth \$1000 each and 18 tons on the dump at the mine worth \$400 per ton. How is that for rich ore?

## Northumberland District.

A RECENT STRIKE.—Belmont Courier, March 28: Adams, Brewer & Co.'s mine continues to look well as work progresses. An assay made by County School Superintendent Geo. Nicholl gives 384,999 ounces in silver, valued at \$497.76 per ton. This is one of the oldest districts in the county, and this recent strike is very encouraging to the prospectors who have done so much deadwork on this property.

## Pioche District.

RESUMED WORK.—Pioche Record, March 28: Mr. S. T. Godbe, who came in Tuesday, immediately began operations for the resumption of work on the Yuba mine, and from him we learn that the first work done will be to retimber a portion of the shaft and to drift on the 10th level to fully explore the ore body discovered there during the working of the mine last fall. Only so much ore will be hoisted as is necessary to allow work to be freely done; the bulk of it will be allowed to remain in place until transportation facilities become better, which, from present appearances, will be no great length of time. About 15 men will be employed at first and others will be added as the work progresses.

## Stafford District.

THE PALISADE MINING CO.—Eureka Sentinel, March 31: The Sentinel is glad to be able to announce that there is to be a revival of mining operations at Stafford district, in this county, with the opening of spring. Mr. Kelly of San Jose having rid himself of all litigation and conflicting interests in the Onondago property, has revamped it on a sound basis and will begin vigorous operations as soon as the weather will permit. He has changed the name of the company from the Onondago to the Palisade Mining Co. He has a strong company of San Francisco men and plenty of money in the treasury to prosecute the work of development. George Obriter is to be superintendent. Following are the directors of the new company: Wm. H. Sharp, President; Peter Hopkins, Vice President; L. Sissinvine, Wm. T. O'Neil, J. L. Radovich. We are assured that thorough and systematic work is to be inaugurated and carried forward in this promising camp by the Humboldt. Supt. Obriter is expected up by April 10th, if not sooner. We shall expect good reports from the operations of the new company almost from the start. The Onondago has yielded a good deal of rich ore in the past, and well-informed mining men believe that it only needs the expenditure of a little capital and labor to make it permanently productive.

## ARIZONA.

CLARK'S NEW COPPER DEAL.—Butte Inter-Mountain, March 28: Mr. W. A. Clark, who is just home from New York, was interviewed to-day by a reporter concerning the reported purchase by him of copper mines in Arizona. "Yes," he said, "I have made a deal for some copper properties down there, in north Arizona and New Mexico. I didn't buy them, however, as I see it was reported, but leased them for two years. I have an arrangement, though, practically for the purchase of the Arizona mines, but am not at liberty to give the details." Continuing, Mr. Clark said that the Arizona properties leased by him are known as the United Verde mines. There are some eight or ten in the group. They were worked quite extensively in 1883-4, but not much since. The San Pedro mine is the name of the New Mexico property. The United Verde group show plenty of ore of good grade. There is a smelting plant of about 100 tons capacity on the mine. Mr. Clark says his product here will be about 25 block copper and the balance high-grade matte. It is 24 miles over a rough road to the railway, which will somewhat cut down the profits, but with the present prices there is good money in it. He may decide to increase the capacity of the works. The San Pedro, the New Mexico property, is a peculiar mine, he says. It is both a copper mine and a free-gold quartz mine all in one. There is a 25-stamp mill on the ground to treat the gold quartz and smelting works of 70 tons capacity per day to treat the copper ore. The location is about 40 miles east of Albuquerque and some 10 miles east of a railroad. He has simply a two-years' lease upon this mine.

## COLORADO.

THE LEADVILLE MINES.—Herald-Democrat, Mar. 30: The El Paso shaft is showing up some good ore. The water company has been draining the Miami shaft. The Continental Chief is shipping largely just at present. Some ore is being extracted from the Bohn shaft on the Matchless. It is stated that the iron shipment has increased noticeably within the past week. Work on the Jo Davis is progress-

ing well and some good minera being developed. Mr. Shinn of the Silver Cord Shinn lease reports a very satisfactory outlook for a rich strike. Most favorable reports come from the Argo shaft in Big Evans gulch. Work is being pushed rapidly. There are good indications of a large body of ore at the Lee, and the company is pushing rapidly into new territory. Work on the Lucy L., in Tennessee Park, is to be resumed. The Arkansas valley has four furnaces in blast at present, the Harrison Reduction Works four also, and the Manville two. Good reports come from the Silver Cord. Manager Blow states that there are the most favorable indications. Increased shipments are being made from the Olive Branch. Several cars of the most promising ore were shipped to the Argo smelter yesterday. The Minnie and A. Y. mines are working with full forces now. Some very good shipments have been made to the American smelter during the past week.

## DAKOTA.

GALENA.—Deadwood Pioneer, March 29: Talk of blowing in the Galena smelter is revived. Mine-owners claim that sufficient ore can be supplied to keep the plant running indefinitely, and are eager to have fires started in its furnaces. It is unofficially announced that this will be done not later than May 1st, when roads, it is hoped, will be in somewhat better condition than at present. Rumor has it that the German syndicate with which Prof. Weinberg is negotiating proposes to put up large works in the district, in the event it makes purchases of the mines now under consideration.

GOLD PLACERS.—The gold placers of Castle creek are attracting considerable attention, and may cut quite a figure in the more rapid development of the southern hills. A gentleman reaching Rapid therefrom a few days ago had with him \$26, which, says the Republican, he has obtained by panning while prospecting.

## IDAHO.

THE MARTIN.—Challis Messenger, March 30: The Martin joins the Barton on the north. Two-thirds of it is owned by Messrs. Taylor & Salisbury and the other third by Eugene McCarty. No great amount of development work has been done on this property, but sufficient has been done to know that it is another Jarvis or Barton, and that the dip of the vein, character of ore, etc., are exactly the same. It was not visited this time, however, as no work is being done at present.

THE HOOSIER.—The Hoosier is next in order and joins the Martin on the north. The Hoosier, although undoubtedly on the same vein, is entirely different from the three claims south. The dip is to the east at an angle of 15 to 20 degrees. The high-grade ore is gray copper, and the concentrating ore, or low grade, sulphide of iron. It carries besides a peculiar ore, about 30 per cent of which is sulphur, which will ignite in the blaze of a candle and burn freely. The property has been purchased by C. E. Taylor for himself and O. J. Salisbury for \$12,000. They have out 100 tons first-class ore running from 150 to 750 ounces silver and averaging 25 per cent copper—about 200 tons second-class ore averaging 50 ounces silver and 10 per cent copper per ton—about 1000 tons of concentrating ore assaying 24 ounces in silver per ton, of which they expect to save 75 to 80 per cent.

SILVER MOUNTAIN.—Idaho Statesman, March 30: Mr. J. M. Hurst is in from Silver Mountain district. He arrived here on Wednesday, the 25th inst. He has been at work in Silver Mountain all winter. He reports that work has progressed there in good shape. The work on the mine has been suspended for want of an orehouse to store the ore, but there is no discount on the mine; it is rich ore and plenty of it. They will build an orehouse to store the ore in and resume taking out ore. There are about 60 men at work on the mill building. No men need to go in until provisions can be hauled in, as they have only enough for the men who are already there.

## MONTANA.

ANACONDA.—Inter-Mountain, March 29: A frame building 260 feet long by 70 feet wide, with a wing 78 feet long by 56 feet wide, with an addition of 125 feet to the tankhouse, are to be erected immediately at the upper works of the Anaconda Smelting Co. The company has advertised asking for sealed tenders for furnishing all the necessary labor. The Anaconda Fire Clay Co. has been offered by outside parties a contract to furnish 1,500,000 bricks. They have taken the proposition under advisement and will probably take the contract.

A FALSE REPORT.—It is now denied on authority of Manager Pardee that there is any truth in the claim of the granite vein having been struck in West Granite ground. The report was apparently started in St. Louis to boom the stock. The Mail of Phillipsburg says: A little excitement exists concerning the property throughout the camp and vicinity, but this is probably due to nothing more than the fact that the Butte crosscut is rapidly and constantly approaching a country in which developments of the most important nature may at any time be expected.

## NEW MEXICO.

FROM VARIOUS CAMPS.—Lordsburg Liberal, March 31: A carload of mill timbers arrived this week for the American Mining Co. John Boucher has ordered an assaying outfit and will soon be prepared to tell any one what he has got. The Ruby Co., at Gold Hill, has a force of men at work on its property. The company wants to know how it looks 200 feet down. The Peerless property is to be sold at El Paso to-day by the trustee. Con. Ryan is working on the Cashman mine and is having his ore tested at El Paso. It runs about 40 per cent lead, and the silver it contains will pay for the transportation and treatment, and leave him a good profit, according to assay value. Frank Reno, owner of the Robert E. Lee mine, in the Pyramid district, is having a quantity of his ore concentrated by the Gipsy Queen mill with satisfactory results. This mill is now being run by Gammon & McNichols, under a lease, and is in fine shape and is doing excellent work. Superintendent Longmaid of the Carlisle Co. reports that with economy in the use of water, he is able to keep 60 stamps dropping day and night

with results in the shape of but- tlely satisfactory to the com- the Bachelor mine at Stein's Pa- the ledge on their south ground a wide, of excellent ore, a great dea free gold.

COOK'S PEAK.—Kingston Shaft, camp is looking up. When the smel- here lead ore was hauled from Cook's El Paso Smelting Works now have 30 at work on three claims they have bonded. Two years ago three men constituted the camp at Cook's peak, now about 50 men are at work. The ore is hauled 12 miles to Florida station, on the A. T. & S. F. R. R., 15 miles east of Deming, at a cost of \$3 per ton. J. J. Purcell and Frank Thurnmond are interested down there in the Jay Bird and the Fat Man. Purcell is working the Jay Bird and taking out ore that runs 20 ounces in silver and 66 per cent lead, and as the El Paso smelter pays about 60 cents per unit, this makes the ore worth about \$60 per ton. Col. Woodhall has a bond and lease on the Fat Man. McDaniel & Carpenter are starting a small force to work on the Superior. Oliver Teal has the Summit bonded for \$5000.

BONANZA HILL.—Kingston Shaft, March 28: We have mines on the Bonanza Hill and both north and south in lime and in porphyry—to speak in general terms—with great banks or mountains of granite on the west, constituting the Black Range of mountains, which seem to have pushed up through the lime, leaving the mineral deposits on either side, for on the other side of the range is lime with larger deposits of mineral than on this side, although not as rich as far developed. This applies only to the immediate vicinity of Kingston, both north and south.

## OREGON.

ONION AND SILVER CREEK MINES.—Bedrock Democrat, March 25: Our reporter yesterday met in the city Mr. John Cabell, an extensive mine-owner of Granite mining district. First, Mr. Cabell spoke of the mining property of Mr. Ike Klopp, on Onion creek. Two tunnels have been run on the Klopp mine during the winter just past, No. 1 about 150 feet and No. 2, 130 feet. In both tunnels the ore vein has been cut and is from 2½ to 3 feet in width. The ore is free milling and of good shipping quality. One and a half miles east of Onion creek Mr. Klopp is doing development work on the Ajax, from which he is getting some very rich gold ore. Mr. Klopp, as well as our other miners, will ship his ore to Denver for reduction. Two miles above the Klopp claim on the head of Onion creek, and adjoining the La Bellevue, Garrison & Co. have struck a body of high-grade sulphuretted shipping ore at a vertical depth of about 140 feet. They have developed an ore body 300 feet in length, averaging 3 feet in width. This company are now making preparations to ship ore throughout the summer. The La Bellevue, the property of the Cabell Bros., is showing up far in excess of anticipations. The past winter's development work has been diligently prosecuted on both sides of Cabell mountain. On the southwest side we have run through 150 feet of shipping ore, in width from 3 to 5 feet. We have on the dump over 100 tons of shipping ore. Will ship first early in May and continue through the season. On the northeast side of the same vein the ledge has been cut at a depth of 130 feet, showing vein about three feet wide; all first-class ore. From where the tunnel is situated on northeast side of vein to the location of tunnel on southwest side of vein is a distance of about 100 feet, which demonstrates almost to a certainty that the vein is continuous. The mines in general throughout the district are looking well, better than at any previous time. Adjoining Granite mining district on the east is Silver creek mining district. The mines of this district have been developed throughout the winter, and as a rule, look very encouraging. Take our section as it at present appears, and I can truthfully say that I never have seen as favorable a showing before, and I have had many years' experience as a miner.

## TEXAS.

SMELTING WORKS.—Rio Grande Republican, March 25: The International Smelting Works of El Paso commenced operations last Tuesday. The furnace is of the Frazer & Chalmers make, of 40 tons capacity, and C. C. Fitzgerald is the owner. The Bennett mine at Organ furnished the first charge, and the blow-in was entirely successful.

## UTAH.

SILVER REEF.—Cor. Pioche Record, March 28: The river-mill, which for the past two months has been running on custom ores, closed for repairs the early part of the week, but will start up again shortly, we understand, upon ore from the Duffin mine.

LEACHING WORKS.—There is some talk of starting up the Ventura leaching works again. These works are of 50 tons capacity per day. Although we have no confidence in the leaching process, we are satisfied, now that the works are complete, and can be started with very little or no expense, that with proper management they can be made to yield a fairly good profit, provided that 12-ounce ore, of which there is an abundance in this camp, can be procured.

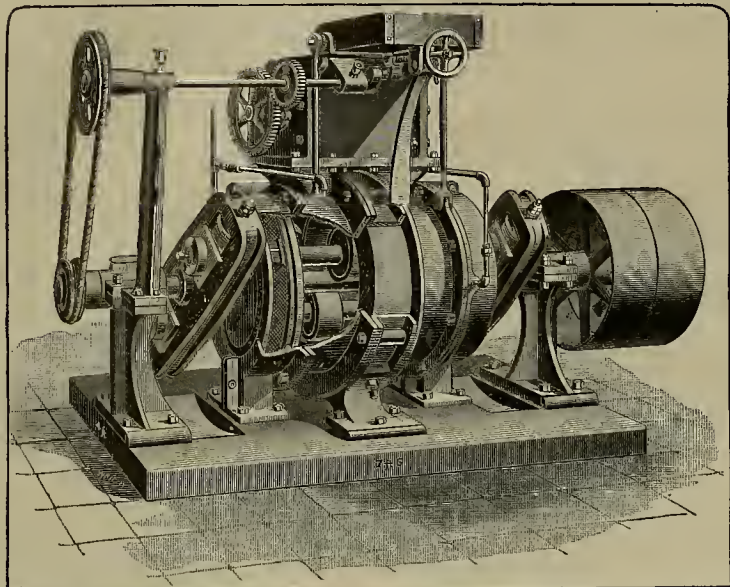
PARK NOTES.—Record, March 31: W. H. Van Alstine has taken a contract to drive the Wasatch tunnel 500 feet further into the hill, and the work was commenced Thursday last. The Wasatch tunnel has many tons of good ore on the dump now, and with the completion of this new contract it should show up as a paying property. A number of men at the Daly have been laid off till the roads become solid enough for wagoning. Many hundreds of tons of ore are housed up at the mine, and if more be taken out there is no convenient place to store it. Several Ontario miners have been laid off temporarily for the same reason.

ORE AND BULLION SHIPMENTS.—During the week the Crescent shipped 90,000 pounds of first-class ore. Owing to bad roads the Ontario, Daly and Sampson are not shipping ore at present. The shipments of Daly bullion from the Marsac mill are as follows: March 25th, 10 bars, 11,047 fine ounces of silver; 28th, 10 bars, 11,022 fine ounces, and to-day the product will be 12 bars. The Ontario is making another bullion shipment.



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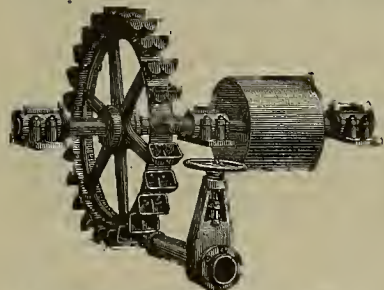
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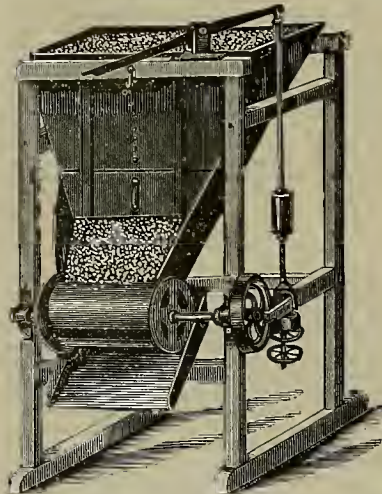
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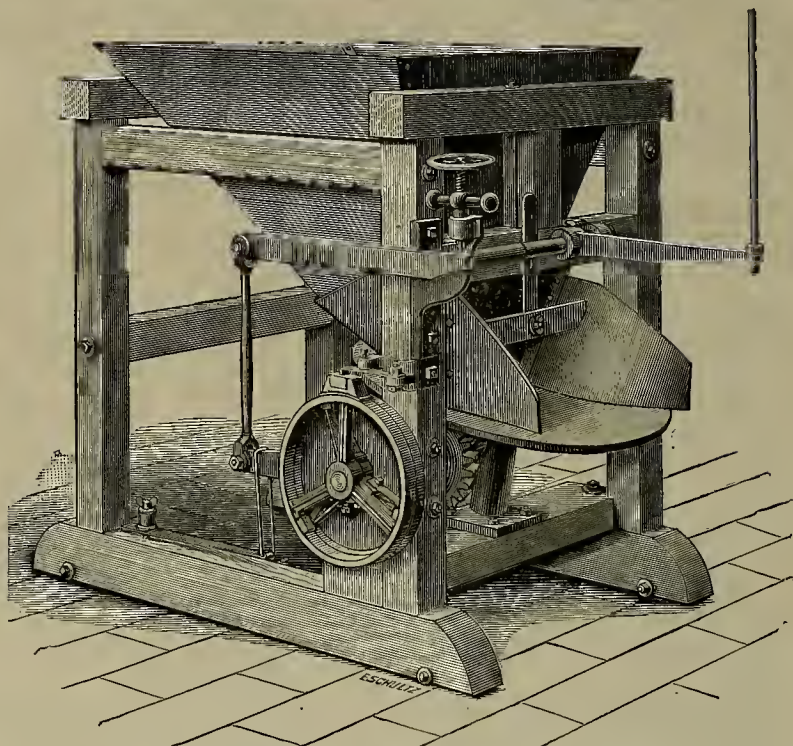
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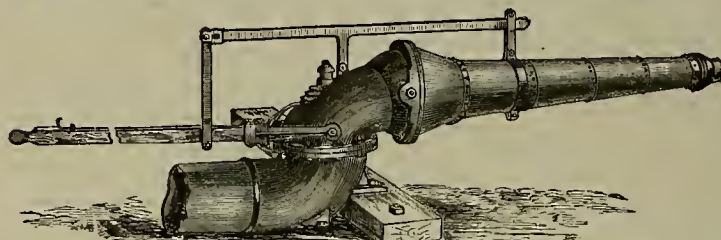
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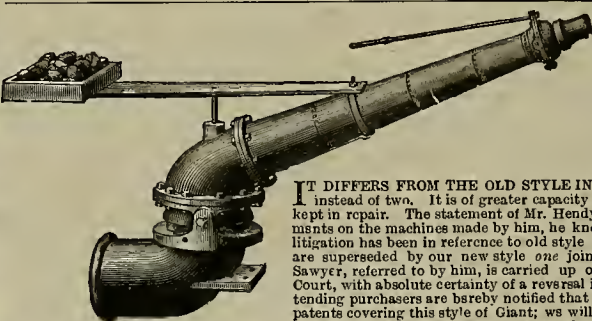


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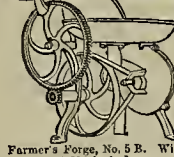
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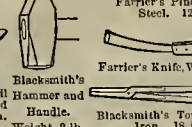
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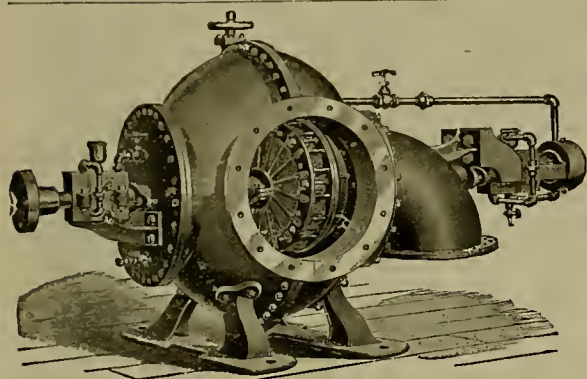


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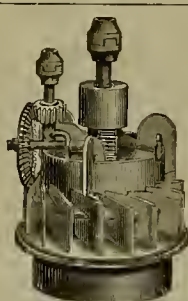
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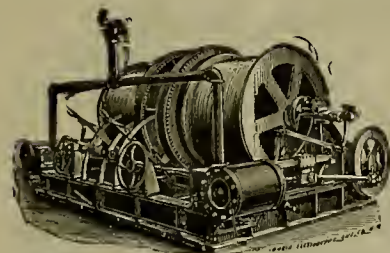
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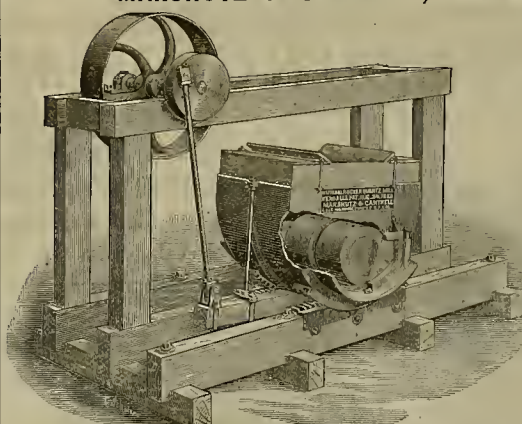
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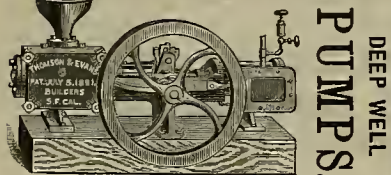
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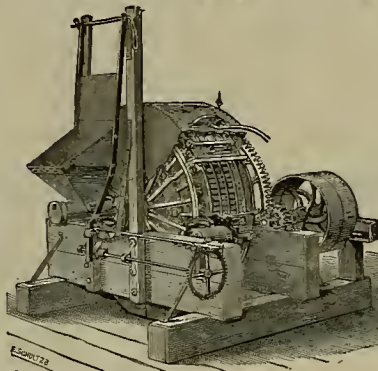
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**MISCELLANEOUS MACHINERY.**—Flour Mill Machinery, Saw Mill Engines and Boilers, Dredging Machinery, Powder Mill Machinery, Water Wheels.

**Tustin's Pulverizer**  
WORKS ORE WET OR DRY.

**ENGINES AND BOILERS**  
OF ALL KINDS,

Either for use on Steamboats or for use on Land.

Water Pipe, Pump or Air Columns, Fish  
Tanks for Salmon Canneries

OF EVERY DESCRIPTION.

Boiler Repairs promptly attended to and at very moderate rates.

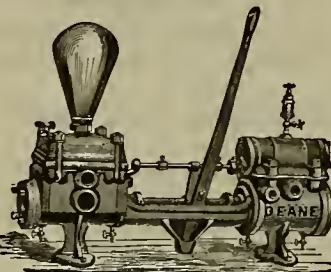
AGENTS FOR THE PACIFIC COAST FOR THE

**Deane Steam Pump.**

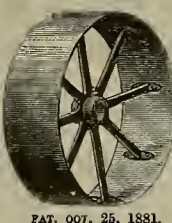
SPECIALTIES:

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DEANE STEAM PUMP.



PAT. 007, 25, 1881.

**PERFECT PULLEYS**

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Laundry Free for the use of Families  
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ROOMS WITH OR WITHOUT BOARD.

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**L. PETERSON, MODEL MAKER,**

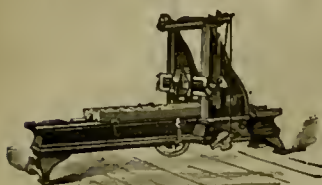
258 Market St., N. E. cor. Front (upstairs), San Francisco  
Experiments machinery and all kinds of metal, tin, copper and brass.



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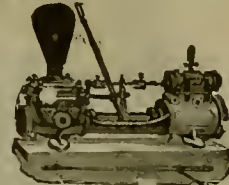


Fatnam Planer.

# PARKE & LACY.

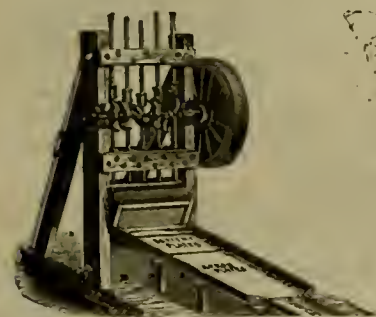
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For Saving Gold in QUARTZ, GRAVEL and PLACER MINING,

At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best, and far superior to others in weight of silver and durability. Old mining plates replated. These plates can also be purchased of JOHN TAYLOR & CO., cor. First and Mission Sts.

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IN QUARTZ, GRAVEL, OR PLACER MINES. MADE OF BEST SOFT LAKE SUPERIOR COPPER  
 FULL WEIGHT OF SILVER AND BEST QUALITY OF WORK GUARANTEED.

GET OUR PRICES BEFORE ORDERING ELSEWHERE. SAMPLES  
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NOTICE.—All our plates are guaranteed to have the full weight of silver agreed upon, and are tested before leaving our works, thereby avoiding the complaints about light weight, made so often before we started in this branch of industry.

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BRANARD MILLING MACHINES.

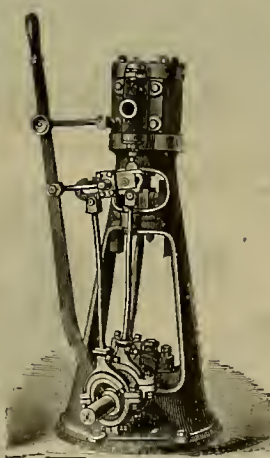
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## THE DOUBLE "ECONOMIC" STAMP MILL.



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

## AN AUTOMATIC ORE FEEDER

Goes with each Mill. We also have a suitable

### Rock Breaker.

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

TATUM &amp; BOWEN,

34 and 36 FREMONT STREET,

SAN FRANCISCO, CAL.

Manufacturers of Mining and Sawmill Machinery, Engines, Boilers, Etc.

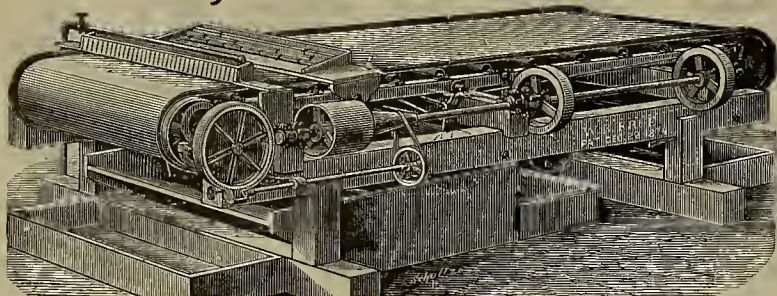
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FROM 2 TO 100 H. P., ALWAYS IN STOCK

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# \$1,000 CHALLENGE!



**PRICE: FIVE HUNDRED AND SEVENTY-FIVE DOLLARS (\$575.00) F. O. B.**

OVER 1400 ARE NOW IN USE. Concentrations are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

THE MONTANA COMPANY (Limited), LONDON, October 8, 1885.

DEAR SIR:—Having tested three of your Frue Vanners in a competitive trial with other similar machines (Triumph), we have satisfied ourselves of the superiority of your Vanners, as is evidenced by the fact of our having ordered twenty more of your machine for immediate delivery. Yours truly,

THE MONTANA COMPANY (Limited).

N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

ADAMS & CARTER.

Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

**THE FRUE ORE CONCENTRATOR OR VANNING MACHINE.**

**ADAMS & CARTER, Agents Frue Vanning Machine Co.,**

Room 7, No. 109 California Street,

**SAN FRANCISCO, CAL.**

WM. H. TAYLOR, President.

R. S. MOORE, Superintendent.

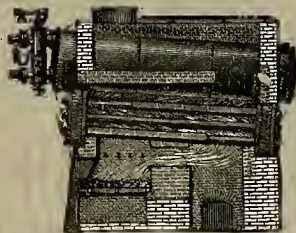
L. R. MEAD, Secretary.

## RISDON IRON & LOCOMOTIVE WORKS

Location of Works, S. E. Cor. Beale and Howard Sts., San Francisco.

Manufacturers and Sole Agents for the Pacific Coast for

**HEINE SAFETY WATER TUBE BOILER.**



Has the Following Advantages:  
**SAFETY, DURABILITY, ECONOMY,**  
AND FACILITY OF INSPECTION AND REPAIRS.  
60,000 Horse Power now in use.

Boilers can be seen working in San Francisco at Palace Hotel, Spring Valley Water Works, Huester Bros. & Co., California Jute Mills, and other places.

Guaranteed More Efficient than any other Boiler made.

### BUILDERS OF

**QUARTZ MILLS**—Gold and Silver, Copper and Lead Smelting Works, Roasting Furnaces of all kinds.  
**AIR COMPRESSORS**—Rope Power Transmission.  
**HYDRAULIC PUMPING** and Hoisting Machinery.  
**WROUGHT-IRON WATER PIPE** a Specialty. Note.—Have just completed order for 35 miles of 44-inch pipe of 4-inch iron for Spring Valley Water Works Company, San Francisco.  
**SAW-MILL MACHINERY** of all kinds.  
**STEAM ENGINES**—Corlies, Slide-Valve, Poppet Valve Automatic, Single, and Compound.  
**SOLE MANUFACTURERS** for Pacific Coast of the Celebrated "Heine" Patent Safety Boiler (Water Tube); 60,000 horse power now in use.  
**MACBETH PATENT STEEL-RIM PULLEYS**—Fifty per cent lighter and 25 per cent cheaper than cast-iron pulleys; will not break in transportation.

**REFRIGERATING MACHINERY** for Steamships, Breweries, and Cellars.  
**WILSON'S PATENT GAS-PRODUCER.**  
**STEAM BOILERS** of all descriptions.  
**SUGAR MACHINERY**—Sugar Mills, Vacuum Pans, Clarifiers, Double Effects, etc.  
**STEAMSHIPS**—Steam Yachts, Marine Engine and Boilers, Screw Propellers, Centrifugal Pumps, Steam Pumps, Steam Capstans, Cargo Winches, etc.  
Builders of 120-stamp Gold Mill for the Alaska Mill and Mining Company; 60-stamp Mill for Quartz Mountain Mining Company.  
Send for Circular and Price Lists.



1850. 1887  
**RANKIN, BRAYTON & CO.,**  
BUILDERS OF...  
**MINING MACHINERY.**

San Francisco: 127 First Street. Chicago: 100 N. Clinton. New York: 145 Broadway.

**PLANTS FOR GOLD AND SILVER MILLS,** embracing machinery of LATEST DESIGN and MOST IMPROVED construction. We offer our customers the BEST RESULTS OF 35 YEARS' EXPERIENCE in this SPECIAL LINE of work, and are PREPARED to furnish from SAN FRANCISCO or CHICAGO, the MOST APPROVED character of MINING AND REDUCTION MACHINERY, adapted to all grades of ores and SUPERIOR to that of any other make, at the LOWEST POSSIBLE PRICES.

We are also prepared to CONSTRUCT and DELIVER in COMPLETE RUNNING ORDER, in any locality, MILLS, CONCENTRATION WORKS, WATER JACKET SMELTING FURNACES, HOISTING WORKS, PUMPING MACHINERY, ETC., ETC., of any DESIRED CAPACITY.

## THE HAZELTON BOILER.

A NEW AND RADICAL DEPARTURE IN  
**STEAM GENERATOR.**

DESTINED TO REVOLUTIONIZE ALL FORMER METHODS. A SAVING IN FUEL OF AT LEAST 25 PER CENT GUARANTEED OVER ANY OTHER STYLE OF BOILER.

The following parties have these Boilers in use or under construction on this Coast, to whom reference is made:

Spring Valley Water Works, S. F.	1 200 H. P.	Starr & Co. Mills, Wheatport.	1 100 H. P.	San Jose & Santa Clara Electric R. Co.	1 100 H. P.
Southern Pacific R. R. Co., S. F.	1 75 H. P.	Selby Smelting Works, Vallejo Junction.	2 125 H. P.	San Diego Electric R. R. Co.	1 100 H. P.
California Cotton Mills, East Oakland.	1 150 H. P.	Selby Smelting Works, Vallejo Junction.	1 75 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
Harmony Borax Mining Company, Alameda.	1 75 H. P.	Oakland Gas Light Co., Oakland.	1 200 H. P.	La Luz Mining Co., Mexico.	3 75 H. P.
				Santiago Mining Company Central America.	1 60 H. P.

SEND FOR CIRCULARS.

**PACIFIC IRON WORKS, San Francisco, Cal.**

**F. A. HUNTINGTON,**

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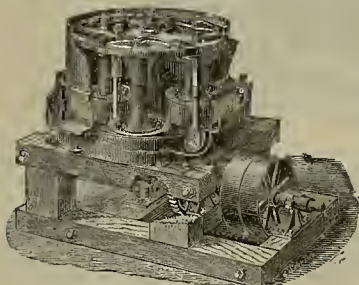
**Centrifugal Roller Quartz Mills, CONCENTRATORS AND ORE CRUSHERS,**

Mining Machinery of Every Description,

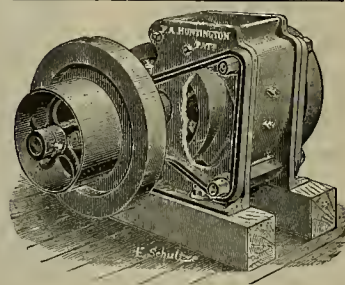
**Steam Engines and Shingle Machines.**

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No. 45 FREMONT STREET, - - SAN FRANCISCO, CAL.



Centrifugal Roller Quartz Mill.



ORE CRUSHER

**"RED FLAX CORD"**

**SQUARE FLAX PACKING,**

Manufactured from strictly first-class Flax and pure lubricants. Superior to all others for Water and Steam. Packs with less friction and makes a tighter joint than any other packing made. Limitations of inferior quality having been put upon the market, we have been compelled to adopt the above trade-mark, and all of our packing will now have a RED CORD running through the center its entire length. See that you get it and take no other. Sold by all Hardware dealers. Price, 50 cents per pound. W. T. Y. SCHENCK, Sole Manufacturer, 222 and 224 Market St., San Francisco, Cal.



**ARE YOU GOING TO PUT UP MACHINERY OF ANY KIND?**

Are you going to make any change in machinery? Do you want Pulleys on Shafting already up? If so, don't fail to look into the merits of

**THE DODGE PATENT INDEPENDENCE**

**WOOD SEPARABLE OR SPLIT PULLEYS.**

They are the Lightest, Strongest, Best Balanced and

**Most Convenient Pulleys Made in the World.**

Entirely new and original. Adapted to any power required. Time, trouble and money saved by using these pulleys.

Price List and Catalogue mailed free.

JOHN SIMONDS, Pacific Coast Agent, 509-513 Mission St., S. F.



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, APRIL 14, 1888.

VOLUME LV.  
Number 15.

## Building Roads and Pavements.

Among the first things the ancient Romans did after conquering a new country was to make good roads so that they could quickly and expeditiously transport their armies and munitions of war. How well they succeeded can be seen to the present day in some Roman roads that are still in existence. It has been found by people who have made the subject of roads a life-long study, that the secret of their permanency is a good foundation. Without a good foundation, it is foolishness to expect to get anything to stand the wear and tear that modern roads have to stand. It is necessary first to get a good, solid, unyielding base on which to build the roadbed, and lay on the upper crust of granite, basalt, gravel, or bituminous rock.

The machine which is illustrated in this week's PRESS is one that is being introduced by our enterprising citizen, J. B. Jardine of the Atlas Iron Works, to meet certain requirements in road making, especially in the rural districts, where sometimes in the rainy season it is impossible to move an empty wagon, on account of the poor condition of the county highways, which are often little better than mud-puddles in winter and dust-bins during the hot, dry summer. In fact, many California roads are a standing joke and disgrace to the State. The people of the Eastern States have been long alive to the benefits of good roads, and in Europe the greatest attention is paid to the subject. The "Queen's highway" between London and Glasgow, 455 miles long, is kept in just as good condition over its entire length as our beautiful drives in the Golden Gate Park, and that through the agency of just such a machine as we illustrate this week. What a splendid city we will have when our city fathers wake up to the fact that bituminous-paved streets are better than cobblestones if rolled and compacted by a machine like that illustrated. Great sanitary benefits are to be derived from streets that can be kept clean and free from dust, which blows in our eyes, ears, and nostrils in summer and clogs up our sewers in the winter. The cobblestones and poor roads break our axles and lame our horses. This could all be remedied if the people would avail themselves of our natural substances, which are so abundant, and the mechanical talent at hand. This city alone ought to own three or four such machines, and should compel all contractors to have their work well compacted by rolling before they lay down a

single basalt block or crosswalk flag. These machines are made in all sizes, from 3 to 20 tons in weight, and can be easily handled. One of these machines (in fact the subject of our photo-litho) has just completed Golden Gate avenue, a drive that is a pleasure to ride over, besides being a credit to our city. They are in use in San Diego, Los Angeles, Santa Barbara, San Jose; but the Queen City of the Pacific Coast is now without a modern machine to roll its hundreds of miles of streets, which are sadly in need of its friendly pressure. No

WATER-WHEEL FOR LOW HEAD.—Summer Shaw of Boston, now in this city, has a form of water-wheel of novel construction, which it is his intention to apply in places where there is a small body of running water with low head. The wheel is composed of a hub secured to a spindle, and an annular ring secured to the hub by radial rods or wires, to which are hinged a series of wings or blades. These wings or blades fill the space between the annular rim and the hub, and swing freely, though the swinging motion is limited to a certain space

## A Prize for Water-Power System.

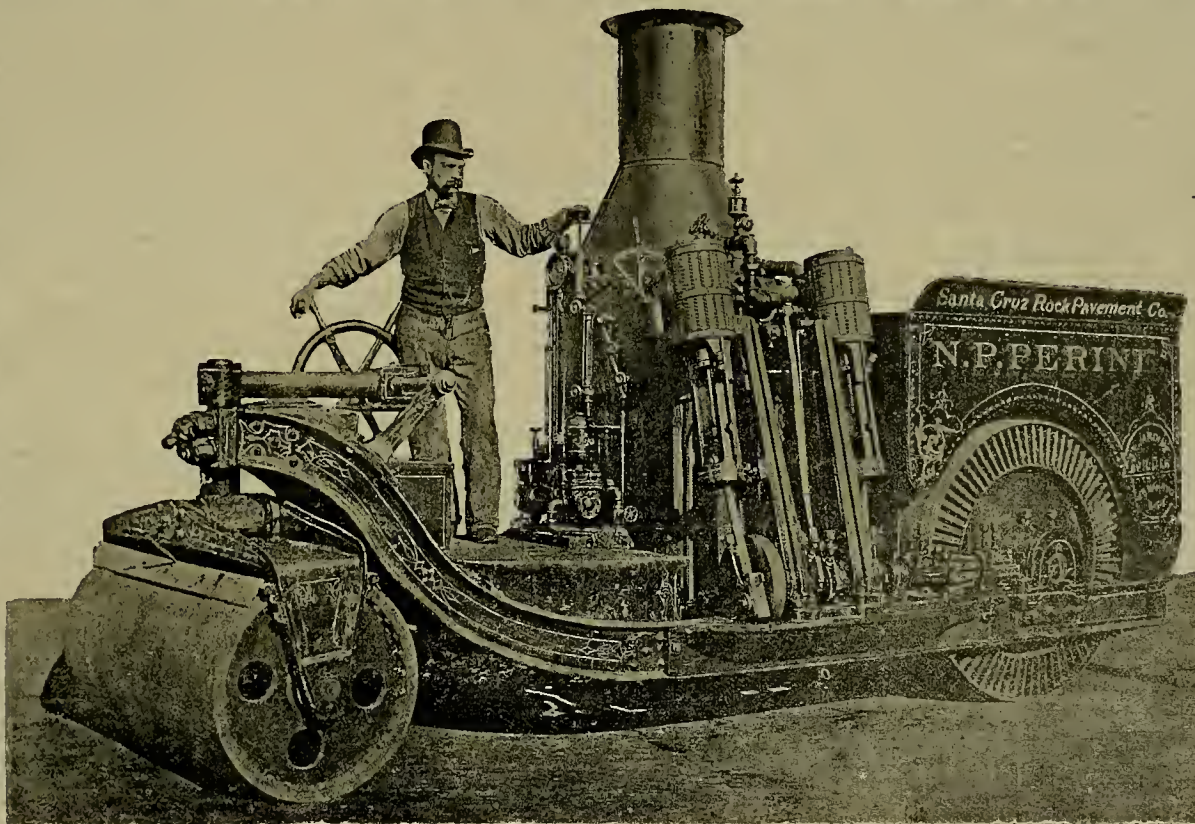
The City of Buffalo is about to offer a prize of \$100,000 to the inventive ingenuity of the world for the discovery or invention of the best system for utilizing in the most practical manner the immense water-power of the river at or near Buffalo. The money has all been subscribed, but is yet to be collected. When this is completed and the subscribers organize they will reply to all inquiries as to technical requirements. The circulars giving this information are signed by James B. Stafford & Bro. of Buffalo. It must be remembered that this does not refer in any way to the water-power derived from Niagara Falls (22 miles from the city), but for utilizing the principal current of the river at or near Buffalo.

The city has a water-front of about five miles, running 2½ miles along the shore of the lake and 2½ miles along the Niagara river. The position of the city gives it great commercial importance, and its manufacturing interests are extensive. There are 30 or 40 large iron-manufacturing enterprises among others. The leading establishments are blast-furnaces, rolling-mills, foundries, breweries, tanneries, manufacturing of agricultural implements and flour-mills. The coal trade is enormous.

It is reasonable to suppose that some of our California inventors may compete for this prize. In the mining regions of this State many problems for the utilization of water-power have been worked out in working hydraulic mines, quartz claims, and especially river-bed diggings. The big ditches and flumes have furnished power for removing seepage-water, etc. Of course the conditions are different in the case in question, but there is no reason why our inventors should not put on their thinking-caps and try for the prize. There are various well-known methods of utilizing water currents, but doubtless all of these have been already considered and some more practicable one is wanted.

At the Old Dominion Copper Co.'s mine, Arizona, the bins are full of ore and there is a good supply of coke on hand. The new double-compartment shaft has been fitted up with cage, etc. It will greatly facilitate the opening up of new ground.

It is stated that Wm. H. Patton, well known in Nevada, has struck it rich on land adjoining the Bunker Hill mines, 200 miles from Adelaide, Australia. It is a silver property.



ROAD-MAKING MACHINE BUILT BY THE ATLAS IRON WORKS. Neg. #26, 489

wonder the southern cities are booming. They are hiring away the best of our talent, buying our best machinery for sewerage and grading their town and nine mile drives, while we, in this city, sit idly by and wonder what it is all about.

CALIFORNIA MARBLE.—Israel Luce, superintendent of the Inyo Marble Co., who is East in connection with plans to make California marble better known and also to secure machinery to increase the present plant, says that he considers that favorable progress has been made at Washington. He had a conference with the supervising architect, accompanied by Congressman Morrow. The architect said that when specifications are sent out for public buildings on the Pacific Coast, he will include bids on Inyo county marble.

In a quarrel over a mining claim, last Friday, Joseph Shannon was shot and killed near Steamboat Springs, Nev., by Chas. Grappe, who was working the mine with him on shares.

ATTEMPTS were made to form a corner in tin at London, but have been abandoned.

when acted on by the force of the water. It is Mr. Shaw's intention to place several of these wheels on the same shaft, a few feet apart. The series of wheels is then to be placed in a closed box or flume through which the water is led, the wheels occupying nearly the whole space in the box or flume, so that all the water that passes shall act upon them. It is his opinion that by having a series of wheels on the shaft he will utilize a great deal of power that is now wasted in having only one wheel.

IMPORTANT LEAD ORE.—Chief of Special Agents Jewell says that there is no information in the possession of the Treasury of which he is aware to indicate that lead ore is being smuggled in any quantities into the United States from British Columbia or Mexico. Several years ago the question was raised as to the rate of duty to be paid on silver ore containing a large proportion of lead imported into this country. The Treasury decided that the duty should be paid at the rate fixed on the article of chief component value in the ore. If it contained more lead than silver, it was to pay the duties fixed on lead, and vice versa.



## CORRESPONDENCE.

We admit, undorsed, opinions of correspondents.—EDS.

## The Proposed Obliteration of Idaho.

EDITORS PRESS:—The PRESS has already more than once taken occasion to object to the proposed dismemberment of Idaho Territory, a project that until recently we supposed had been abandoned, not so much because of what we had written against it as because of its obvious impolicy. After suffering it to rest for some time, William M. Stewart of Nevada, the author and staunchest advocate of this measure, has again called it up in the United States Senate, through which branch of Congress he is endeavoring to push it with his well-known ability and energy.

We do not at this time recur to this subject with the purpose of reproducing the arguments already employed by us in its discussion, but to simply advance one objection not before urged by us, to wit, the extent to which this extinction of Idaho, if finally effected, will reduce the representation of the Pacific Coast in the United States Congress. Consummated, and this measure wipes out another prospective member from the Pacific group of States, at best none too large in view of the preponderance of the Eastern States in the legislative halls and councils of the nation. To deal with Idaho in the manner suggested by Senator Stewart would be to expunge her from the map of the United States, for once severed and annexed to her neighbors, she could never be territorially restored. Her very name would be obliterated, there being nothing left to which it could be applied. The Congress will be willing to consign one of our fairest and most promising political subdivisions to such a fate, we do not believe. There is not in the great Northwest another Territory enjoying a higher prosperity or having before it a more brilliant future than this which it is now proposed to cut up and forever blot out.

Idaho will in a short time have population enough to warrant her admission to the Union. As regards natural resources and already created wealth, she might even now aspire to that position with as much reason as did some of her neighbors who have long enjoyed that distinction. As far as population is concerned, there would be more sense in annexing Nevada to Idaho than in the reverse of such proposition. Better, however, that the boundaries of both remain as they are, neither being wanting in the elements necessary to the successful maintenance of statehood.

We are not a little surprised that a man so noted for sound business sense as is Senator Stewart should have made himself so conspicuous in this movement, which we can hardly believe meets with the approval of his judgment. His course is best explained perhaps on the supposition of a too great desire to carry out the wish of his constituents and aggrandize his own State. While the honorable gentleman may have spared severe censure for this, it is still the duty of the public press to inquire after and care for the interests of the country at large. We hope to see this measure meet in the United States Senate with the condemnation under which it so justly end so generally rests on the Pacific Coast.

H. D.

## One of Montana's Gold Mines.

## The Empire Mining Co. Limited.

EDITORS PRESS:—This company was organized in London nearly two years ago, with a capital stock of 100,000 shares at £1 per share.

The first property acquired by them was the old Whippoorwill mine and mill and the Empire. These properties are located six miles from Marysville, Lewis and Clarke county, Montana, by the wagon-road via Gloeter, but in a direct line over the divide not over three miles west of Marysville. The Whippoorwill property had an old-style 10-stamp mill, in which the ore down to the water level had been worked in the usual crude manner, not saving a very high percentage. It was, however, rich enough to pay, but when water was struck in such quantities that it could not be handled by the old bucket process, the mine was shut down as worthless. The same parties owned the Empire, and, having a good showing at some two or three different points where the vein had been opened, the sale was made that caused the organizing of the Empire Co., with a paid-up capital of nearly half a million dollars. They selected Frank L. Sizer as resident manager. Operations were at once begun to open the Empire vein. To systematically satisfy themselves of the magnitude of their property, five stamps were added to the old plant and results carefully watched. At the same time a tunnel was started to connect with the Whippoorwill. This, when completed, will be 1200 feet in length, and will tap that property at 150 feet below the old workings. It was a gigantic undertaking, as it was through the hardest kind of formation, but at the time of my visit they expected to reach the ledge by the 10th of this March. Should the opening of the Whippoorwill reach their anticipations, they will have a very bright future ahead of them, in the fact that regular dividends will be assured.

The first work of this company was done in

May, 1886. During the 12 months following the manager was able to satisfy his company of the permanency of their property to such an extent that a new mill was decided upon, as the old one at best was a "clap-net" affair, and a new 40 stamp mill was decided upon. That old veteran huilder, Tom Fisher, was called in and given charge of the improvements. Mr. Fisher has superintended several of the best plants that have been erected in this Territory, and in every case has done himself great credit, and as this is the last, has had the advantage of all his former experience.

The company decided to make it a 60-stamp mill with every convenience known to modern mill-building, to simplify and reduce the expense of handling and reducing ore.

The ore is dropped from the mouth of the tunnel by tramway to the mill, and on its arrival there is dropped automatically to the rock-breakers, and from there to the Challenge ore-feeders to the stamps, and thence over the plates to the vanner-room, where the tailings are concentrated by 24 Frue vanners. After this there would seem to be but little chance for any value to remain. The ore bins at the mill have a capacity of 2500 tons, and the bins at the mine half as much more. During the past year they have run nearly 6000 feet of levels and have developed the Empire to the 425-foot level, where they find they have a large body of free ore running from 10 to 16 feet in width that will average from \$15 to \$20 per ton. An ore chute of this size makes tons of ore very rapidly. They have the cost of mining and milling reduced to a minimum. The total expense of mining, milling, tramway, office expense and percentage of wear and tear of machinery does not amount to \$4 per ton. This, with the large bodies opened on their lower levels and the prospects that were known to exist in the Whippoorwill when work was stopped on account of water, will render dividends in the future almost compulsory. Quite a town has built up around the mill and mine. Probably 500 or 600 people are now residing in the vicinity and gaining a living from the Empire in one way and another. Already the company have paid two dividends aggregating over \$70,000, and a third will be declared before the mine will have been in operation two years. This ought to be a fair showing for the investors and a handsome interest on the amount of cash invested.

Frank L. Sizer has conservatively looked after the interests of the Empire Co. ever since its inception, and from appearances is fully alive to the interests of the company at all times. Wm. Catron, the mining foreman, is also a man of extended experience, having filed the same office on other properties, and is giving the Empire Co. the full benefit of his years' experience.

## Mining Accidents.

John H. Sullivan, a miner engaged in the Hale and Norcross, working in a drift that connects the north and south upraises 115 feet above the track floor of the 700-level, was caved on last week by a heavy mass of earth, and died from the effects of his injuries almost as soon as extricated.

A few minutes before this cave occurred there was a slight cave at about 80 feet from that point, which knocked down a man named James Sullivan. James, not feeling well from his injuries, concluded to go on top, and while he was being rubbed around the shoulders, where he was hurt, the cave occurred on John Sullivan.

The two Sullivans have been working partners in the Hale and Norcross about four months. John Sullivan was a man of splendid physique, standing about six feet in his stockings. He was a native of Canada, aged 43 years, and has been on the Comstock about 20 years. He was a very quiet man and well liked by all who knew him.

On the following day a premature explosion of a blast in the stopes, about 60 feet above the 700 level of the Hale and Norcross, literally filled James Cavanaugh with fragments of rock. After the accident Mr. Cavanaugh climbed down 60 feet of ladder to the 700-level, walked to the shaft, and after being hoisted to the surface walked into the office of the foreman. He was very badly hurt but will recover, none of the missiles having penetrated the bowels.

A fatal accident occurred in the Kennedy mine near Jackson, Amador county, by which the skip-tender, William Richards, a young man about 26 years of age, and a native of Cornwall, England, instantly lost his life. The unfortunate man was at the 740-foot level, and by some means fell to the bottom of the shaft, a distance of 200 feet.

It is thought that the explosion in the Rich Hill coal mine, near Kansas City, by which 30 men lost their lives, was caused by natural gas.

J. G. LEMMON and Mrs. Lemmon have been appointed botanist and artist to the Board of Forestry. Mr. Lemmon has been supplied with photographic appliances, and will start immediately to investigate the habits and growth of the forest trees of California. He will also gather data of the flora, and Mrs. Lemmon will make drawings and sketches. This information, when obtained, will be incorporated in the board's annual report. This work has been found necessary, as no book and very little reliable information can be readily obtained.

## The Drumlummon.

[From our Correspondent, R. G. HUSTON.]

Montana Co. Limited, an old and tried company, are still operating their mine and plant in their usual live and active manner. Their 120 stamps have been constantly dropping during the last 12 months, with only an occasional cessation long enough to clean up.

Their production for the year 1887 was a little over \$2,000,000. This amount with an average expense account of about \$60,000 per month, leaves a very handsome margin for stockholders, and although the production fell off in the last two months of '87, no apprehensions need be felt of the future of the mine.

The reserves of high-grade ore may not be as large as one year ago, yet ample is in sight to keep the Drumlummon plant operating to its full capacity for years. They are now sinking and cutting out stations at each 100 feet, and running levels to tap the different ore chutes to keep a sufficient amount of ore in sight to supply their ore bins in future. At the time of my visit they were about 50 feet below the 800-foot level, and ere this at the rate they were then sinking they have reached the 900. Levels have been run I might almost say by the mile during the past year, and each one developed at the usual points. The ore chute as found in the upper levels is in some places larger, in others smaller, but with only the usual variation looked for in mining.

One very singular circumstance is the finding of a very large body of oxidized ore on the 800-foot level in an ore chute that at the 400-foot level was very base. This is one of those freaks of nature that we sometimes find and are unable to furnish a satisfactory solution for.

The Montana Co. are still operating their mine and works on the basis of good pay for good work, and "spend your money where your own sweat will may lead you"—a disposition that I can most heartily commend. I believe that any company can get better service from employees to whom it accords the privileges of a free agent than when it presumes to say to them where they shall live or buy their goods.

The insurance company that they were about organizing when I was there one year ago has been a success, and all are highly pleased with its management and the benefits accruing. The company have been very liberal in their connection with this institution, as for every dollar that is paid into the treasury by employees they contribute a like amount. This makes it almost worth a small premium to be in the employ of the Drumlummon Co. They are careful in the most minute particulars that everything around their works shall be absolutely safe so far as it can be made, and against accidents unforeseen they have fostered this insurance until every man is insured for \$1000. Accidental insurance in case of death, and indemnity in case of being hurt.

In the way of supplies they purchase everything in quantities. That makes prices very low to them. They have acres of cordwood piled up eight feet high, insuring them against running short in that line. During the past year they have been connected with the outside world by railroad, a branch of the N. P. R. R. being laid from Birdseye Station. It is about as heavy a grade and the most crooked piece of road I have ever traveled over. However, they have a fair service over it and a great improvement over the old wagon travel from Helena.

The Montana Central have a road graded in, but as they did not finish their road to Helena until late in the winter, will not iron their Marysville branch until spring.

The town of Marysville has improved very much in general appearance during the past season. Many houses have been built, and a better class of buildings, showing a more permanent feeling among the residents. The old mining superintendent of the Montana Company, Mr. Henry Bratnaber, has taken a trip to Central and South America this winter for the benefit of his health. He carries with him the best wishee of the management, and all with whom he came in contact, for the speedy recovery of his health.

Manager R. T. Bayliss is still in charge, and so long as he remains there the company's interests will be safe in every particular, as he is devotedly applying his time to securing the general prosperity of the Montana Co.

The production of the Montana Co., it is reported, all goes to Tiffany's establishment in New York on account of its peculiar fitness for his uses in manufacturing, and shows the magnitude of his operating. Over \$2,000,000 in raw material used in one year is a large showing for a manufacturing company.

QUICKSILVER AND AMALGAM.—A correspondent who signs himself "W" writes us as follows: "We have a silver-mill here that runs off some floured quicksilver and amalgam with the tailings. How can they be separated so as to tell the percentage of each and so each can be assayed? Panning won't answer at all."

THE HOUSE COMMITTEE on Mines and Mining have approved the bill amending the Alien land law. The amendment provides that the restrictions of the law shall not apply to mines of gold and silver, tin, lead, cinnabar or copper, or any interest therein.

## The Mines and Miners.

BY PEDRO CASTERA.

(Continued from issue of Jan. 21st.)

[Translated for the PRESS from *El Minero Mexicano* by M. N. M.]

The publication of our story having been unavoidably suspended, we resume it at the point where it will be remembered, the administrator seated on a projecting piece of decayed wood and clinging with bleeding fingers to the rock, heard voices at the mouth of the shaft.

## The Fatal Fall.

The criminal had communicated to the director of the mine his account of the accident, and all the employees had hastened to assist in recovering the body of Don Rafael from the bottom of the tiro. A moment more and he would be saved. His hands were fastened to the rock as if they were of steel, and full of anxiety, he looked up—then closed his eyes, dazzled by the brightness of a *tea* (torch) which was rapidly descending—et that instant a man with his back to him, passed behind and near him. It was the cajonero Jose. He immediately let go his hold of the rock and seized the rope. The force of the movement was such that the stick, with a great creak, broke and fell.

At the noise which it made, the cajonero looked up, and, seeing the administrador, began to blaspheme and to ascend, armed with a ponider, which he carried between his teeth. Separating the two, there was a distance of some 20 varas, and, while Jose was climbing up, Don Rafael quickly fastened himself with the cahallo to the rope, which was shaking dangerously, and balanced himself over the abyss. As the cajonero was impeded by the *tea* he cast it to the bottom of the shaft and all was dark again. When the light was extinguished the melacate (windless) was started in the reverse direction, the employees fearing some new accident, and the cable ascended with vertiginous rapidity. Don Rafael, after securing himself to the rope, drew from his pocket a large cleop-knife, and, reaching beneath him, attempted to cut the rope. In doing so he heard the labored respiration of Jose, who, comprehending the action and its result, accelerated to the utmost his ascent. The administrador went on cutting, but in a feeble manner, the cajonero all the time approaching and a struggle more fearful than the former was about to take place when suddenly the rope broke at the place where it was cut, and Jose, with a cry of horror, fell to the bottom.

When Don Rafael came out, his presence caused no little surprise. He explained all that occurred, except how it happened that in such a short time his hair had changed from a brilliant black color to a silvery white.

## In the Works of the Dolores.

Ten years have passed and still the blood surges again whenever the event which I am about to relate is recalled. It is not a description, however, but only a slight sketch, that I am going to give of what is yet retained in my memory. I was temporarily in control of a mine called Mina Alta de Ajuchitan, situated on the highest part of the highland of the same name near the town of Cayuca, in the State of Guerrero. I do not exaggerate when I say that the heat was suffocating. At sunset it marked 33° Reaumur. In order to escape that torrefaction, I passed the day in the mine, and like certain twilight birds, only went out when the sun could no longer lavish upon me its carcasses. At six o'clock in the evening the night people appeared, numbering 50 paradados or barreteros or it may be 100 men and 20 faeneros. At the same hour, the day people began to go out, and both those entering and going out were intoning that canticle, which is a supreme adios to the light, to the sky and to life, and which they with simplicity call the alabado. The former descended, going to the depth of 400 meters. Their voices became confused and more distant, and soon there was audible only a kind of colossal sigh which issued from depths full of darkness and of dangers. By means of the harretas (small hares of steel), the hammers, the picos (pickaxes), and powder, and by continuous labor, both dangerous and difficult, the hardest rock is pierced, torn asunder, and comminuted. Thus they advance, a few inches in a day, but they advance! The barreteros begin their work, accompanying the noise of their hammer-blows with an ay! ay! ay! It is called singing the harreno, and aids their respiration, while at the same time it conceals their fatigue. In the meantime the placemen engaged in the management assemble, the corks of the champagne bottles pop, and the liquid overflows in waves of snow-white foam, while the men in the mine are expending their sweat and blood. And for what? To gratify the insatiable and stupid thirst for gold. Let us, however, put aside philosophy, which must be vain, and proceed, not inventing but describing.

One night I was at supper with the placemen, when suddenly we were startled by a strange, confused noise, which we were coming from beneath us; that is, from the interior of the mine below. It was a formidable noise. No one moved, notwithstanding we were obliged by the severity of mining discipline; but the faces of all turned pale and the laughter ceased. The noise increased and we comprehended that a



caving was taking place at some unknown depth. Sin novedad! Sin novedad! cried out the sentinels of the patio at intervals of a minute between each alerta (watchword). I gave the key which I had suspended at my belt; the administrador communicated my order to unlock, and immediately after a *mandon de barras* (foreman), pale, blood-stained and almost out of breath from his rapid ascent, said in a tremulous and interrupted voice: There is not, your worship—any more danger—only that—the contracielos—of the Dolores—was falling.

#### The Buried Miners.

It is well, I replied. How many paradás are in it? Ten, and four fieras. How many men have escaped? I inquired. Not one. Twenty barreteros are buried, as work was not begun. Alive or dead? Alive, because they

infinite anguish, hours during which they live years, in which the hair whitens, and when, ignoring all danger, they have thought only of saving the imperiled life of one or more of their companions. I was soon in the works of the Dolores, the roof of which was bulging out. An *abra* (crack) in the roof which is called *contracielo*, had broken the *ad-me* (side timbers) which support it, and was the cause of the noise and of the caving which had cut off communication with the twenty barreteros who were in it. By the crackling light of the torches, more than fifty men, but *men indeed*, of copper-colored complexion, stripped for their labor, bathed with sweat and lacerated by the dropping stones, were at work removing the fallen material, placing props of live oak against the hill, the continued caving of which caused them to break as if they were shingles, and which,

#### Metallurgy of Zinc.

In recent numbers of the PRESS we have given some sketches of zinc furnaces. We give herewith another form of furnace, which Mr. Melville Attwood of this city used some years ago. Mr. Attwood writes as follows:

The calcination or roasting of the ore is done in various forms of furnaces—some having steam jets introduced through the fire bridge.

The Belgian furnace is the most economical, and the charge is worked in one-third of the time taken by the other modes, but the loss is much greater and the spelter produced not so good.

In 1841, in consequence of the failure of spelter works in Derbyshire which owed me a

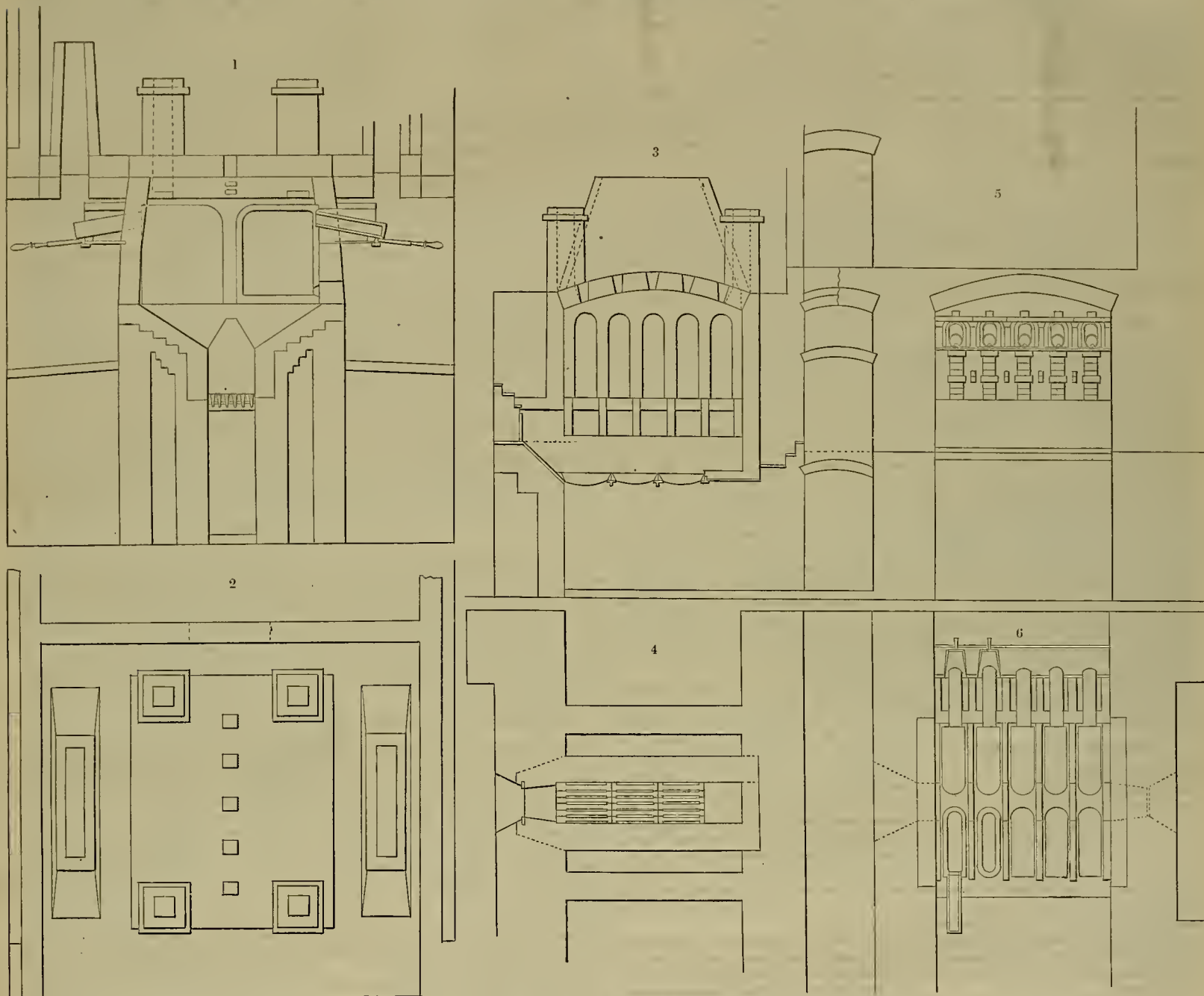
Put Up by Melville Attwood at the Cheadle Copper and Brass Co., 1844 "

The average yield of the calcined blende for the quarter's working was about 50 per cent of spelter.

At the Cheadle Works they had one of the old calamine brass furnaces, and I tried to substitute calcined blende in the place of the calamine, but it did not succeed—that is, the brass was not so good.

The fine brass buttons of our ancestors were made from calamine brass, and Camorarius says that the Egyptians (long before the Romans) had so great a veneration of brass that they made images of it and laid them in the graves of their kings to preserve their bodies from putrefaction, and to men of lesser quality they nail d their dead bodies with many brass nails.

The improvement in the market for zinc or



AITWOOD'S FURNACE FOR THE DISTILLATION OF ZINC.

hear their cries for succor. O! foot, señores! I said, twenty lives are in danger; let each one do his duty! Let us go! they replied, with one voice, some running to the patio, and others to the interior of the mine. The noise increased; it was now a clamor, and mingling with the screams that were issuing from the mine were the alarfas of the sentinels, and the dismal sounds of the two bells giving the alarm. A few moments afterward all the men, women and children were grouped in the patio, singing the alabado. The children were making beds of leaves for the wounded, the women were preparing lint and bandages, and the men, dragging timber and ropes, disappeared through the dark hole into the mine. While the alabado was being sung, the bells were ringing, the clamor was increasing and the sentinels were still exclaiming "Sin novedad! Sin novedad!"

An hour after there remained in the patio only the sentinels, the administrador and myself. I left him in command, as it was my duty to go into the mine, and I went down. There is no need to draw upon the fancy. The great tragedy is nature. To copy it is sufficient, and the picture is true, even though terrible.

I write this for the miners, for those dear brothers who have passed, as I have, hours of

like an inverted volcano in eruption, was throwing out stones that wounded those who were engaged in the rescue.

(To be Continued.)

THE Martinez Item says the coal mining of the Mt. Diablo coal range is but yet in its infancy, and only awaits the outlay of sufficient amount of capital to reopen and work veins of the black diamonds which will prove of even greater richness and extent than the surface veins which have been worked in the past. There is an underlying coal belt extending from the Nortonville mine at the base of Mount Diablo to a point on the Marsh creek, that in the future will develop astonishing results as far as coal supply is concerned. Today the Pittsburg at Somerville and the Central are being worked and large quantities of the bituminous commodity shipped all over the coast. We must take exception to the broad assumption that California is destitute of this valuable commodity, as Contra Costa claims the proud distinction of having within her borders coal sufficient to afford all the families of California fuel necessary to keep them warm during all the cold winters to come, besides enough to produce steam for her manufacturing and river steamers.

large sum of money for zinc ores, I was obliged to take part of the works for the debt. Their failure arose from not being able to make retorts which would stand the change of temperature when charging them with ore.

After a number of trials, with much hard work and great expense, by mixing a large proportion of burnt clay with the raw, and allowing the mixture to stand some time before using it, I at last succeeded in constructing retorts that would stand the change of temperature and last for from four to five months. I made the first set with my own hands. The drawing which I now give to you shows the great difference in the furnace and retorts I constructed and those in use in other parts of England at that time.

The form of the retort enabled me to produce a very pure metal, and in 1843 I rolled some of it into sheets at the Cheadle Copper and Brass Co.'s Works in Staffordshire. I believe it was the first English-made zinc that was made into rolled sheets. The metal I produced was in great demand, so much so that it induced me to erect, with other partners, besides the four furnaces at Cheadle, eight in Derbyshire and ten in Cumberland.

I see among my old papers one headed "The Quarter's Working of Four Spelter Furnaces

spelter, although not so great as that of copper or tin, has been marked by a steadiness which certainly has been anything but characteristic of either copper or tin. The great and increasing demand of zinc for galvanizing wire alone has consumed a very large quantity of zinc, a very heavy waste of metal being entailed in the operation.

In the accompanying engravings, Fig. 1 represents a vertical cross section through the middle of the furnace, showing position of retorts above the fireplace; Fig. 2, top of furnace; Fig. 3, longitudinal section of furnace; Fig. 4, ground plan; Fig. 5, front view; Fig. 6, section showing how the sides of the retorts are made to form the flues.

(To be Continued.)

RESIDENTS of Taylor, White Pine county, Nev., propose forming a co operative company to develop the mines in that district.

The lessees of the Lapanta have had 100 tons of their ore worked at the Kinkead mill, the proceeds being \$7158 47.

A HUNTINGTON CRUSHER is pulverizing ore from the Lung Syne mine, Dan Glen, Humboldt county, Nev.





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SAN FRANCISCO  
Saturday Morning, April 14, 1888.

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## Passing Events.

The miners in the Territories are to be congratulated on the repeal of the Alien Act as far as it relates to mines. They can now sell their mines to any one who wants to buy, irrespective of nationality. The passage of such an Act was of great detriment to the mining interests of the Territories, and we are very glad it has been repealed.

The reported gold discoveries in Lower California may be bona fide and may not. Gold has been known for many years to exist in the localities mentioned, but on the whole peninsula water is more or less scarce. It is not probable that the discoveries will attract more than local attention.

The bullion product of the famous Comstock lode is increasing rapidly. Last month the output was very large. The mines are all being actively worked and are more free from "stock" influences than they have been for years.

An arrangement of great commercial importance has been made public this week, in the announcement that the Canadian Pacific's Co.'s steamship line has made San Francisco its terminal point.

BULLION deposits in the Carson Mint during March exceeded \$200,000, which is more than was received during the first ten months after the opening of the Mint in 1886, and about as much as the refinery is capable of handling.

AN astronomical observatory is to be built at the University of Oregon.

## Free Borax.

It has been asserted that the discovery in this country of any valuable deposit of the useful minerals or metals has invariably been made an excuse for asking Congress to impose a duty on the imported article if on the free list, and to increase the tariff on it if it be already dutiable. Commenting on this fact, a certain class of economists have affected to believe that the finding of such deposit becomes a real misfortune to the country, as tending to enhance the price of the mineral or metal so discovered, as perhaps for the time being it sometimes does. But for all this, the shove is an impolitic and short-sighted view to take of the matter, as the history of the many prosperous industries that have grown out of such discoveries conclusively shows.

To illustrate our position, let us take the case of horax production, a business of recent origin in this country, very little of that salt having been made here prior to 1873. About that time extensive beds of the borates of lime and soda were discovered in Eastern California and Southern Nevada. Though spread over large areas there occurred here comparatively little high-grade material; yet so extravagant were the reports of these new found horax fields sent abroad, that foreign dealers and producers becoming alarmed at once combined to protect themselves against this threatened rival; the crushing out of the latter before it became dangerously strong forming a part of this protective policy.

As a means of reaching the end proposed, a syndicate of English and French interests was formed, immense quantities of the borate of lime from the Turkish deposit near the Sea of Marmora, the richest in the world, were shipped to London and there converted into horax acid, which article was afterwards sent to this country, being here admitted duty free. This movement had the effect intended. Our home companies, unable to compete with the cheap foreign article, after struggling along for several years, were obliged to suspend operations altogether, their works having remained closed for more than a year. At the end of that time, with some improvement in the market, the most of these companies resumed work, though their business languished until Congress came to their relief by placing on the imported commodity the present moderate duties, which, under the new tariff schedule, it is proposed to abolish altogether.

Should this measure prevail, it will have the effect to kill the horax industry on this coast entirely, at least that is what the companies engaged in the business tell us. Through the introduction of many improvements and the observance of an almost niggard economy, working in unison and avoiding an overproduction, these companies have, for the past five years, been able to keep their works going, though their profits have been small, hardly more than the margin covered by the existing tariff. This removed, and their net earnings would be so nearly extinguished that there would be no inducement for them to longer keep the field.

And now let us see what this abandonment of the business would mean: In the first place it would mean an early and marked advance in the price of horax to the American consumer. How great that advance would probably be is best denoted by the price that formerly obtained for this salt, which, up till the time that it began to be made on this coast, sold currently at 33 cents per pound in the markets of the world. For the past 15 years, since our salines began to be large producers, the price has not averaged over ten cents per pound, being at present not over eight cents per pound, a figure that it will not be likely to even exceed in the future if our home companies can be left in the enjoyment of the protection now extended to them.

With the destruction of this industry a large working force, consisting of laborers in the salines and the works attached, of mechanics, woodchoppers, teamsters, etc., would be thrown out of employment. The farmers, haymakers, and stock-raisers in the vicinity of the borate fields would be deprived of their best, and in most cases their only, local market, the loss of which would compel many of these people to emigrate from the country, while the several companies now engaged in the business would be out to the extent of their investments,

amounting to an aggregate of a million dollars or more.

Having stated the case of the home manufacturer briefly but fairly, we wait to hear what the advocate of free horax has to say in behalf of that policy.

## Amending the Alien Act.

Senator Stewart of Nevada introduced some time since in the United States Senate a bill for so amending the Alien Act as to prevent foreigners buying mining properties in the Territories. This bill having been called up a few days since, passed the Senate by a vote of 31 to 13. That it will pass the House and finally become a law is highly probable. What is remarkable in connection with the consideration of this measure in the Senate is the fact that it should have met with so much opposition in that body, seeing the objectionable clause was retained in the original through sheer oversight, it having been prepared and passed at the close of the session, when all was confusion and hurry.

Those who would naturally have opposed this bill had they been aware of its exact character, failed to do so, under the impression that it was designed to merely prevent the purchase by foreigners of large tracts of the public domain, a practice that had come to largely prevail and was just then the subject of much complaint. The extension of its provisions to the mines was an idea so absurd that its incorporation in the bill never, it may be presumed, occurred to the members of Congress most interested in the subject. As for the author of this bill, he frankly admits that this clause was inserted in it with no definite purpose, his acquaintance with mining matters being so limited that he did not know whether it would prove detrimental to that interest or not. In short, our legislator, knowing nothing about the mines himself, seemed to have proceeded on the hypothesis that if there were anything in his bill objectionable to the miners their friends in Congress would have looked after and sought to have it eliminated therefrom.

Conceived in ignorance and passed by mistake, it is well this law should meet with immediate correction. It would have been to the credit of our law-makers had this been accomplished with less noise and to-do, and at an earlier date. That a blunder so inexcusable and gross should be repaired so quickly and quietly as possible, were certainly a feat for all concerned.

## Good for a Worked-out Mine.

When the big bonanzas of the California and Consolidated Virginia mines, which made a number of millionaires, were worked out some years ago, the general impression prevailed that the Comstock mines, and especially the two mentioned, were "played out." Little ephemeral camps all over the coast made a great fuss over them and called attention to their superior advantages. But the Comstock miners kept on working away against all sorts of obstacles. Within the past two years the bullion production has gradually increased on the Comstock, and if the record could be shown for other camps, it would make them famous.

The March report of the Consolidated California and Virginia mine is as follows:

Mill.	Tons.	Gold.	Silver.	Totals.
Morgan.....	5,000	\$89,441	\$93,639	\$163,070
Eureka.....	3,730	109,056	143,369	252,416
Totals.....	13,730	\$178,497	\$241,009	\$420,456

The yield of the Morgan mill was \$13.88 in gold and \$18.72 in silver, while the yield of the Eureka was \$12.49 in gold and \$16.99 in silver.

Since the present discovery was made the mine has yielded as follows:

	Gold.	Silver.	Totals.
October, 1886.....	\$93,155	\$113,357	\$206,742
November.....	168,733	219,636	387,824
December.....	185,738	236,362	422,100
January, 1887.....	134,099	237,804	371,903
February.....	97,775	172,817	270,592
March.....	112,212	188,328	300,540
April.....	115,281	167,506	282,787
May.....	186,515	175,981	362,496
June.....	135,973	157,971	293,944
July.....	122,640	168,494	291,134
August.....	100,024	127,741	227,765
September.....	80,755	109,657	190,412
October.....	92,106	135,222	227,318
November.....	112,256	145,596	257,852
December.....	172,378	225,183	397,561
January, 1888.....	100,251	198,346	298,597
February.....	154,183	182,158	336,341
March.....	178,497	241,939	420,436
Totals.....	\$2,326,922	\$3,195,848	\$5,522,770

Dividends out of the present body of ore were commenced in January, 1887, and amount to \$7.50 per share, or about 3½ percent per month

at present prices of stock. The total dividends were \$1,520,000, having been consecutive since January, 1887, except last November, when the fire in this mine and lack of water power for the stamps compelled the trustees to pass the dividend. The two mines were some years ago consolidated into one. They stand way above any other mines in the United States as far as bullion product is concerned. For what people call "a worked-out mine" the Consolidated California and Virginia is doing very well. Even the record of the past year or so is magnificent.

## Preserving Grape Must and Skins.

Ferdinand Springmuhl of London, England, has just obtained, through the MINING AND SCIENTIFIC PRESS Patent Agency, a patent on his plan of preserving must and skins, which he has assigned to the American Concentrated Must Co. of this city. The invention relates to that branch of wine making which contemplates the making of wine at some future time and in other localities from grape must previously prepared. The object is the preservation of grape skins for an indefinite time for the purpose of wine-making, so that there may be obtained from the skins thus preserved, and treated with their own concentrated grape must, the identical wine which would be obtained from the fresh grape must.

In carrying out the process the inventor first separates the grape skins from the stems, the juice and seed by any of its usual appliances. He then presses the skins to free them from adhering juice and dries them as much as possible without extracting the color contained in the organic cells of the skins or heating them. The skins may be separated from the juice by centrifugal force instead of pressing, as it is necessary to carefully avoid heating.

The must or juice extracted from the grapes whose skins are prepared as above is subjected to a concentrating process so as to reduce it from a thin liquid, which it is when first extracted, to a liquor of thicker consistence. To do this, the process *in vacuo* is preferred. The concentrated juice is placed in a suitable receptacle so the grape skins may be mixed with it.

To do this, the pressed grape skins are placed in a vessel, and by connecting one end of said vessel with the receptacle containing the concentrated must, and exhausting the air from the vessel, the concentrated juice is forced into the vessel containing the skins, so that they become saturated with it. For convenience of operating, the inventor uses a metallic vessel, lined with tin, and of a slightly conical shape, of the height of the harrel for shipping the skins. The ends of the vessel should be closed, one end being connected with a vacuum pump and controlled by a valve, while the other end is connected with the receptacle containing the concentrated grape must, the connection being controlled by a valve.

Thus arranged, the air is exhausted from the vessel containing the grape skins by operating the vacuum pump, and at the same time by opening the valve controlling its connection with the concentrated grape-must receptacle, the thick grape juice enters every pore of the grape skins. As soon as the vessel is filled with the concentrated juice, the vacuum pump is shut off and also the connection between the vessel and receptacle. Air is then admitted to the interior of the vessel, and by removing the bottom the grape skins, impregnated with grape juice, fall into a barrel placed beneath. The harrel is then filled with concentrated grape juice, and it is ready for shipment. This condensed juice can be used without fermentation. It makes a very palatable drink which commends itself to those who do not approve of fermented liquors.

**SMELTER AT VANCOUVER.**—The Vancouver City Council has received notification of the acceptance of the proposition of the City of London capitalists for the erection of a smelter at Vancouver, B. C., the city giving a bonus of \$25,000. A smelter to treat 50 tons of ore a day will be built immediately at a cost of \$75,000 or \$100,000. The company hailing it has secured mines sufficient to supply the smelter without buying any ores, and will enlarge the works as the ore offered for sale increases. An American company is also considering the location of similar works at Vancouver.

THE hydraulic dock at the Union Iron Works is kept pretty busy, and is in constant demand.



## Comet A, 1888.

The comet which has been the subject of some little attention from a few early risers, and in all the morning newspapers, is a visitor to this planetary system, which was picked up by Dr. Sawerthal at the Capetown Observatory, Africa, on the morning of February 18, 1888. It is about halfway between being a telescopic comet and a naked eye comet, being very bright and interesting from the one point of view and not very much of a success from the other. It could, however, be well seen with the naked eye at about 4:45 A. M. on a few mornings of this month, before the present moon passed the full, and entirely dimmed the light of the new star. Mr. Chas. B. Hill of the Chabot Observatory furnishes us the following information and the accompanying drawing:

To the naked eye it presented the stereotyped form, the tail being unpronounced and not more than three degrees in length at the best, while in an opera-glass or a small telescope the effect was quite pleasing and interesting.

When the comet was first discovered at the distant Capetown Observatory, it was in right ascension 19 hours 11.5 minutes, and south declination 56° 04', being situated in the constellation of the "Telescope." Within a few days enough observations had been collected at the observatories in the southern hemisphere to compute an orbit for the comet, and this was rapidly done by Mr. S. C. Chandler of Boston, U. S., and Mr. Finlay at the Cape of Good Hope, the observations having been telegraphed all over the world by means of the modern methods of astronomical telegraphy. The elements thus deduced were immediately disseminated by the same process, and soon the whole northern hemisphere was on the outlook for the comet, which, moving very rapidly toward the north, and at the

same time to the eastward, was computed to reach the "perihelion passage" on March 18, 1888. The path marked out for the comet led up to the equator (reached March 28th), through the constellations Capricornus and Aquarius, passing about three degrees to the southward of the third magnitude star *Beta Aquarii*. This is the only bright star in the later portion of the comet's path, and served as an efficient mark by which to pick it up.

The comet followed very close to the prediction made so shortly after discovery. On March 18th it was telegraphed out here to the Pacific Coast that Prof. Swift of the Warner Observatory, Rochester, New York, had seen the southern comet, but California had already been to the front through the interest in such matters displayed by Mr. F. G. Blinn of Highland Park Observatory, East Oakland, who succeeded in picking up the visitor with his reconnoitering glass on the morning of the 16th. [Subsequently it appeared from the astronomical magazines that Mr. Frank Muller had detected the comet low down in the east on the morning of the 14th, he having the use of the great 23-inch Princeton refractor. This was probably the earliest American observation.]

On the morning of the 18th it was carefully observed with the micrometer by one of the assistants at the Chabot Observatory, Oakland, who has continued to secure places, by comparisons with the nearest available and well-determined stars, on all mornings when the weather would permit. A rough reduction of some of these observations has been obtained by the observer, and is given in the following table:

MICROMETER OBSERVATIONS OF THE COMET.				
(Made at the Chabot Observatory, Oakland, Cal., Fred. M. Campbell, Director; 8 1/2 inch equatorial. Observer—C. B. H.)				
DATE.		PLACE OF		
1888.	HOUR.	Right Ascension.	Declination.	
	Hours.	h. m. s.		
March 17th..	5 1/2 A. M.	21 20 27	-13 10'	
March 20th..	5 1/2 A. M.	21 23 35	-11 47'	
March 25th..	5 A. M.	21 39 34	-5 05'	
March 28th..	5 A. M.	21 42 43	-3 52'	
March 29th..	5 A. M.	21 45 51	-2 38'	

The comet is rising a few minutes earlier each morning, and will probably be within reach of our telescope for some time yet. It has grown

## Mining Accidents.

At the Water Lily mine, West Point, Calaveras county, the engineer had his hand crushed in a pinion while tightening a nut with a wrench. The hand was crushed nearly to the wrist, when the wheels were stopped by the wrench, and there he was held powerless with no one about the place to afford assistance and release from the terrible situation. The nearest help at that hour was at the Bazing Star mine, fully 400 yards away, where his cries for help were unheard. Suffering untold agony from the crushed and fastened hand, he finally took his knife from his pocket with the other hand, opened a blade with his teeth, and in desperation he cut off the hand at the wrist joint and thus freed himself. The unfortunate man, whose name is Merun, has gone to the hospital. Timothy Riley was killed last week in the shaft of the St. Lawrence mine, Butte, M. T. He had on the cage a sheet of heavy iron, and it is supposed it was too long for the cage. At any rate, when the cage was nearing the 100-foot level, the engineer felt it catching and jerking. He immediately stopped it. It was

## The Technical Society.

At the meeting of the Technical Society of the Pacific Coast, held on Friday night of last week, Marsden Manson presided. Mr. E. C. Burr described the discovery of a peculiar fungoid growth found in the sewer pipes of his house. The pipes became clogged and gave considerable trouble. He then applied a solution of caustic potash, and the result was there was found in the hopper a mass of fungoid substance which was removed from the pipes. One piece nearly the size of the pipe was 30 feet long. A specimen was exhibited which has an extremely repulsive odor. It is a slimy, tough substance, which had formed in course of time in the house drain pipes.

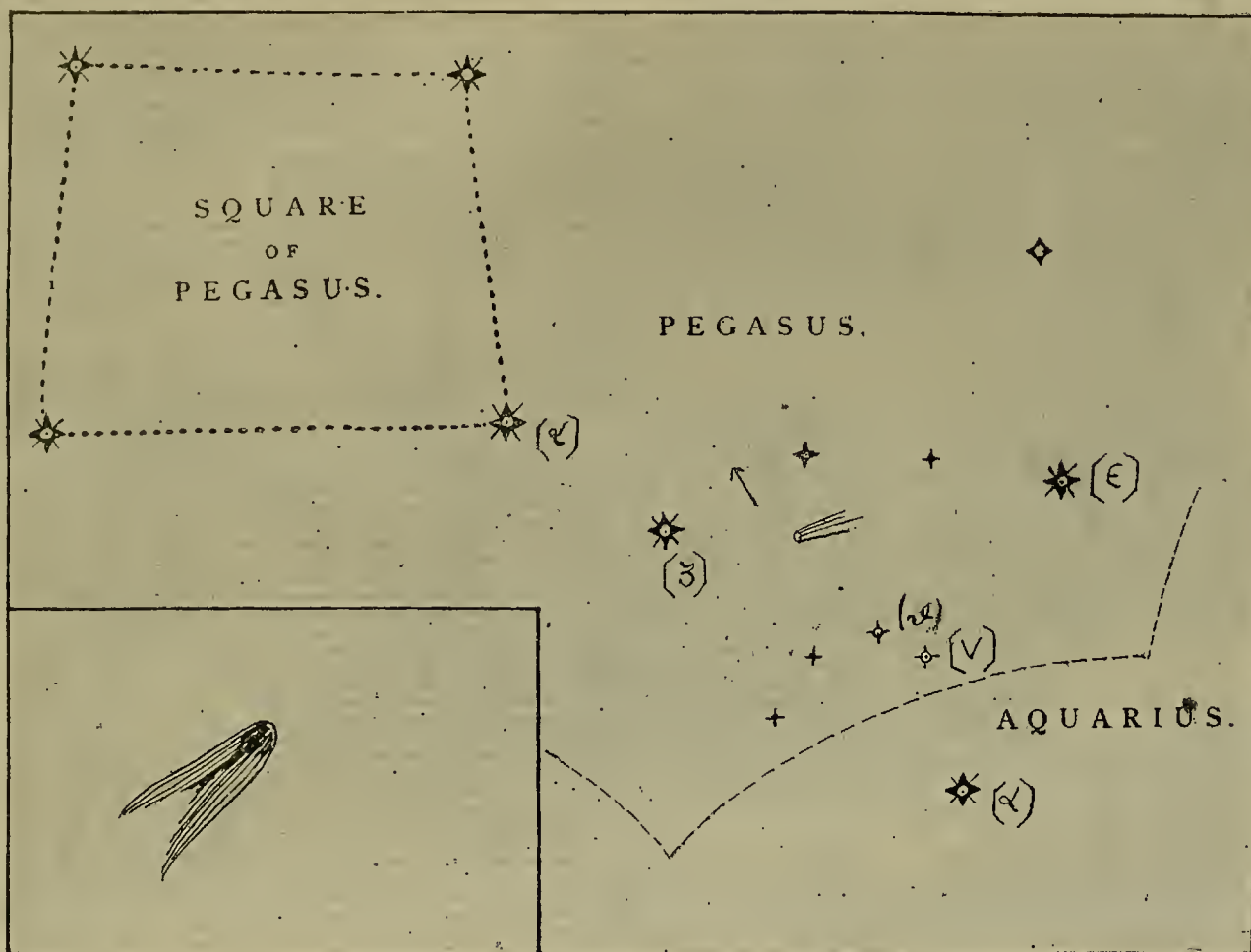
Arthur F. Price, the new secretary of the society, spoke on the subject of the adulteration of oils. He produced several samples and explained the method of testing by diffusion in water, showing that as low as one per cent of adulteration could be detected. By the method employed cards may be prepared which serve as standards for various oils and the adulteration of any can be determined.

President Manson presented to the society weather maps, supplied by the Signal Service office, showing the course of the remarkable storm which passed over the United States last month. It appears that the storm had its inception in the North or Central Pacific ocean and traveled over the continent, taking the form of a blizzard. When it reached the Mississippi valley it subdivided into two storm centers, which traversed in parallel lines Canada and the Southern States. From the meager data at hand, it is believed that the same storm then crossed the Atlantic ocean and passed over the greater part of Europe.

After the adjournment of the meeting, those present went elsewhere to celebrate in an informal manner

the anniversary of the foundation of the society. Speeches and remarks were made by Messrs. Manson, Price, Burr, Keith, Yale and others.

**PATENT INFRINGEMENT DECISION.**—The Supreme Court of the United States has just entered a decree for the largest amount ever given for infringement of a patent. It is in the case of R. A. Tilghman vs. Wm. Proctor, and the plaintiff is awarded \$320,715 damages for infringement of his glycerine patent. In 1854 Mr. Richard A. Tilghman of Philadelphia obtained a United States patent for the manufacture of glycerine and stearic acid from ordinary fat, by the use of highly heated water alone, under pressure in a close boiler. The invention revolutionized the manufacture of candles in this country, and led to the production of glycerine at such a price as brought it for the first time into general use. He visited England and sold his patent to the Prices of London, the great glycerine manufacturers. While engaged in the introduction of his invention into England, several large manufacturers in this country appropriated Tilghman's invention. He sued, and the lower court awarded him \$250,000. An appeal was taken, and now he gets the same amount with interest.



POSITION OF THE COMET ON APRIL 6, 1888.

perceptibly fainter, and will not again be suitable for observers without optical aid even after the moon has left the morning sky. A new ephemeris which represents the present movement of the comet very well indeed has been computed by Louis Boss of Albany, N. Y., and gives the following predicted places:

EPHEMERIS FOR GREENWICH, MIDNIGHT.			
1888.	Right. Ascen.	Declination.	
	hr. m. s.		
April 6.5.....	22 17 49	+8° 43'	
April 10.5.....	22 29 33	+12° 30'	
April 14.5.....	22 40 57	+15° 52'	
April 18.5.....	22 51 59	+19° 55'	
April 22.5.....	23 02 37	+24° 42'	

The position of this comet among the stars for the morning of April 6th is given in accompanying sketch, which is supplemented by a rough sketch of its telescopic appearance on a recent date. It should be easily seen with a good field-glass for several mornings yet. The enlarged sketch on the lower corner of the cut is a telescopic view. On the morning of April 5th the nucleus was seen in two parts, clearly divided about three seconds of arc; this observation was telegraphed to the Eastern observatories, and has received confirmation from a similar observation at Mt. Hamilton.

found that the sheet of iron had caught upon the timbers in the shaft. Riley was not upon the cage. On examination, his body was found at the bottom of the shaft, having fallen 500 feet. It is supposed that the iron by catching in the timbers knocked him off the cage.

Enoch G. Kellogg, son of the foreman of the Lexington mine, Butte, was killed last week by falling down an ore chute to the level below, a distance of 100 feet. He was 18 years of age.

Wm. Rowe, while working in the Gribble mine, near Junction City, Trinity county, was caved upon and killed. He had been warned of the danger but did not heed the warning.

John Polette was injured in the Winnemucca mine, Nev., by a rock falling upon him. Wm. Shea, in the Orleans mine, Nevada county, had his foot mashed by a falling rock. Men and crows were necessary to effect the release of the foot. Thos. Gill of Badger Hill, Nevada county, had his finger mashed by a two-ton howler rolling upon it.

In another column will be found the business card of J. B. Jardine of the Atlas Iron Works of this city, the manufacturer of the road-rolling machine illustrated on the first page of this number of the PRESS.



## SCIENTIFIC PROGRESS.

## Why Does Coal Produce Heat?

The combustion of coal is nothing more nor less than its combination with oxygen gas. When a fuel of any kind combines with oxygen, heat is produced. Why fuel should combine with oxygen no one can tell. It is one of nature's secrets. The chemist tells us that the oxygen and the fuel have an affinity for each other. But when this statement has been made we are no nearer to understanding why combination takes place than we were before. In text-books nothing will be found as to why heat is produced by the combination. On this point an all but universal silence prevails. We are told, however, by a few writers of the old school, that heat energy was stored up in this coal millions of years ago by the sun, and that this heat energy is liberated when the coal combines with oxygen. This is absurd. It will not be out of place to give here an explanation which is consistent with facts, and therefore appears to be satisfactory.

All bodies, substances, gases and liquids are supposed to be composed of multitudes of particles or molecules of almost inconceivable smallness, and these are supposed to be in motion among themselves. This motion is heat; that is to say, heat is neither more nor less than a kind of motion, and this internal vibration can be transmuted into a perceptible mechanical movement, or, on the other hand, mechanical movement can be converted into the invisible motion called heat. How the change takes place no one knows, but the change is none the less a fact. Now, the difference between a solid and a gas is that the motion of the particles or the molecules of the gas is much greater in extent than is the motion of the particles of the solid. Also, some gases have a greater range of motion than other gases. If by any means we can take the motion out of gas, say by compressing it into a vessel the sides and ends of which reduce the range of movement, then, as nothing is lost in nature, the invisible and insensible motion of the gas, which it has lost, reappears as heat in a sensible form, and we find that the sides of the vessel become hot. Now, the oxygen which has combined with coal has a very considerable range of internal motion, but when the oxygen has combined with the coal another gas, known as carbonic acid gas, is produced, as will be explained further on; and the particles of this gas having a much smaller range of motion than the particles of the oxygen have, the difference appears in the form of heat.

It is not necessary to tell readers that coal is not always the same. It is composed of various substances and gases. The principal are carbon, hydrogen, oxygen and certain impurities which make the ash with which we are so familiar. The carbon, hydrogen and oxygen are elements; that is to say, they are not composed of separate substances combined together. They cannot be split up into anything else. In 1000 pounds of anthracite coal there are about 915 pounds of carbon, 35 pounds of hydrogen and 26 pounds of oxygen. In a good bituminous or North Country coal there will be 800 pounds of carbon, 54 pounds of hydrogen and 16 pounds of oxygen.

The difference between the sum of these quantities and 1000 pounds is matter entirely non-combustible, which appears as ash. Of course, there are an infinite number of variations in the proportions which the constituents of coal bear to each other, but the figures we have given fairly represent good Welsh and North Country coals respectively.

The air we breathe is composed of two gases—oxygen and nitrogen. The latter appears to have no effect whatever on human life and combustion. It serves to dilute the oxygen. The two gases are mixed, they are not in chemical combination. By weight, approximately, 36 pounds of air contain 28 pounds of nitrogen and eight pounds oxygen. In bulk they are mixed in the proportion of, roughly, four to one—four cubic feet of nitrogen and one of oxygen, making five cubic feet of air.—*Mechanical Engineer.*

## The Time Occupied in Thinking.

One of the most beautiful applications of electricity which has of late been made is its use in the study of psychological phenomena. And why, indeed, is not the subtle power by which time and space are being annihilated, and human labor rendered less irksome, the most proper agent to assist man in the study of the facts of his own consciousness? In an elaborate article in the *Nineteenth Century*, Dr. J. McK. Cattell gives an account of the time measurements of thought made by means of the line drawn on a rapidly moving surface by a pen attached to the prong of a tuning-fork vibrating at a constant rate, by means of electricity. By a delicate apparatus constructed on this principle, duration of time may be measured to the one ten-thousandth of a second. The writer above named has found that the process of thought varies in its degree of rapidity in different individuals, children and old persons thinking slower than people of middle age, ignorant persons thinking more slowly than educated persons. In this way he also found he could measure the time it takes to perceive—that is, the time which passes from the moment when the impression reaches consciousness until the moment at which we know what it is. In his own case he found that it

took 1-20 second to see white light, 1 10 second to see a picture, 1-8 to see a letter and 1-7 to see a word. It takes longer to see a rare word than a common word, or a word in a foreign language than in our native tongue. It even takes longer to see some letters than others. "Will time," or time taken up in choosing, can be measured. It takes 1-13 second to judge between blue and red. To recall the name of a printed word takes 1-9 second, to a letter 1-6 second, to a picture 1-4 second. It takes less time to remember the name of a familiar word than a letter, though it takes less time to see the letter. The time of remembering can be measured. It takes 1-4 second to translate a word from one language to another when you are familiar with both. It takes 1-20 second longer to translate a word from a foreign language to your native tongue than it does in the other direction. We can think of the name of the next month in half the time we can think of the last month. It has been demonstrated that sensation does not travel through the nerves to the brain so fast as has been supposed. Its speed is not much greater than 60 miles an hour.

**THE NATURE OF HEAT.**—Prof. Dana says: "Heat is now believed to be not a form of matter, once supposed, but a 'mode of motion,' more particularly it is a very rapid undulatory vibration of the particles of matter making up the heated body. When heat is transmitted through a medium without raising its temperature, it is said to be radiated, and the undulatory motion is believed to be propagated at a very great velocity by the particles of a supposed elastic fluid called the ether. Thus, the heat of a stove is said to be radiated in all directions from it; so, too, the heat of the sun is said to be radiated to the earth, and the received is called radiant heat, or radiant energy. When, however, the heat is transmitted through a body at a comparatively slow rate, as from one end of an iron rod thrust into a furnace to the other, it is said to be conducted, and in this case the particles of the bar itself are believed to propagate the motion. A hot body is one whose particles are in rapid motion; but 'hot,' as the word is used, is only a relative term, for this motion belongs to the molecules of all bodies of which we have any knowledge, however 'cold,' and the rapidity of the motion determines the degree of heat (temperature), as manifested, for example, to our senses or to a thermometer."

**MEASUREMENT OF CLOUDS.**—The most important work in the measurement of clouds is now done at the University of Upsala, Sweden, by Messrs. Ekholm and Heggstrom. When opportunity offers, the heights of clouds are determined thrice daily by simultaneous observations at two telephonically connected stations about a mile apart. The angles of conspicuous points are carefully noted by means of specially adapted instruments, giving much more satisfactory data for fixing the distances than have been obtained by the photographic method attempted at Kew. The greatest height of any cloud yet measured is 43,800 feet, and the highest velocity is 112 miles an hour for a cloud at 28,000 feet. The most important result thus far reached from these measurements is the fact that clouds are quite regularly distributed in three layers, the mean summer levels for Upsala being: Low clouds—stratus, cumulus, cumulonimbus 2000-6000 feet; middle clouds—stratus cirrus 12,000-15,000 feet; high clouds—cirrus, cirro stratus, cirro-cumulus, 20,000-27,000 feet.

**THE SENSES OF ANIMALS.**—An interesting thought in regard to the senses of animals has been corroborated by Sir John Lubbock. Animals are supplied with complex organs of sense richly supplied with the nerves, the functions of which organs we are powerless to explain. One must regard his dog with more respect in the thought that in animals there may be several other senses as different from ours as sound was from sight; and even within the boundaries of our own senses there might be endless sounds which we could not hear, and colors as different as red from green of which we have no conception. These and a thousand other questions remained for solution. The familiar world which surrounded us might be a totally different place to other animals; to them it might be full of music which we could not hear, of color which we could not see, of sensations which we could not conceive.

**THE DEPOSITION OF ALUMINUM.**—Aluminum is one of the most difficult and uncertain of metals to deposit electrolytically. The following recipe is given by M. Herman Reinhold, who states that it furnishes excellent results: 50 parts by weight of alum are dissolved in 300 of water, and to this is added ten parts of aluminum chloride. The solution is heated by 200° F., and when cold 39 parts of cyanide of potassium are added. A feeble current should be used.

**VULCAESTON** is the name given to a new article just placed on the market. It has all the qualities of asbestos and vulcanized caoutchouc. Vulcaeston can be manufactured perfectly pliable, and, at the same time, as hard as ivory; it offers a perfect resistance to heat, fire, every kind of vapor, acid and chemical, and will soon find a great many uses and applications, especially in lithography and other graphic arts.

## MECHANICAL PROGRESS.

## Electrically Joined Metals in the Trades.

We think great changes are impending in the method of joining metals of similar and of diverse natures. Electric welding is being seriously investigated as to its probabilities, and before many months have passed there will undoubtedly be several systems in commercial operation. No mechanic has ever witnessed the joining of two metals by electricity without being greatly struck with the results and the very great advantages over old methods in cleanliness and homogeneity.

When electric welding becomes a settled fact, machine parts and all branches of hardware manufacture will be very greatly improved; where solder is now used the metals will be joined together electrically, and where a brass tip, shank or base is needed, it can be united to cast iron, wrought iron, steel, or any other metal, without the chance of being detached. Many things which are now drawn up in brass can be spun up in lathes and burned together, and cast-iron details may be reinforced with steel faces, which are an integral part of the piece. We do not exclude boiler shells from the catalogue of new structures or new methods made possible by electric welding, and instead of courses riveted together we shall have shells and flues in practically one piece, with very much greater tensile strength than riveted structures.

The one thing that has been doubtful about this system of electric welding is the effect it may have had upon the metal itself as regards the deterioration, but it has been shown by investigation and elaborate experiment that this fear is groundless.

To test the question, wrought iron droppings from the welding process were fused again by means of the arc to a bar of about 15 millimeters thickness, and this bar turned down to 10 millimeter. The breaking weight of this bar was 37.5 kilogrammes per square millimeter (23.8 tons per square inch), with an elongation of 17.5 per cent. The fracture was fibrous, like that of soft steel. This electrically fused iron resembles soft steel in other respects, notwithstanding its origin. It is malleable, can be welded, can be bent both cold and hot, and is scarcely harder than soft steel.

In the light of this testimony, we can hardly overestimate the value of electrically joined metals in the trades.—*The Engineer.*

**THROW OUT YOUR ANTIQUATED MACHINERY.** Said a practical mechanic lately: "A notable feature in good machine tools is that they do not so much wear out as become antiquated; hence one sees, in going round some workshops, machines in use of which the owners are very proud, but which should have been expensed years ago by others capable of doing at least twice the amount of work. They are retained simply because they are capable of doing a certain work, which is all very well if we neglect the question of cost, or it may be, as I have sometimes seen, in the case that they represented a certain sum in the stock book, but if carried to the scrap heap it would be necessary to write them off. Looking boldly at this question of capital account, we can easily see that the vital consideration in any workshop is the workman. If we put a workman's wages at \$4 a day, we see that, considering interest of capital and depreciation of machinery at the rate of 10 per cent, the workman is a sort of animated machine and the representatives of a capital sum of say \$1500, so that the question is not whether a man can profitably occupy a certain machine, but whether the machine can profitably occupy this man."

**A NEW SYSTEM OF MANUFACTURING METALS.** The 150 members of the American Institute of Mining Engineers, which recently held in Boston the 18th annual meeting of the institute, visited Fitchburg, Mass., on the 24th of February to examine the Simond's rolling machinery, a new device which is destined to revolutionize the manufacture of metals. It may be briefly described as a machine in which two flat surfaces, acting vertically or horizontally, and moving in opposite directions, with adjustable dies fixed upon them, roll in one motion a piece of metal regular or irregular shape and in almost any pattern desired. At a single stroke of the mechanism may be obtained a sphere, a cone, a chair screw, a bolt with thread and head, a car or carriage axle, and an endless variety of other forms. The visiting experts were amazed and delighted. "It is the greatest thing in half a century," said one. "It marks a new era in the manufacture of iron and steel," said another, and so the comments ran. This extraordinary machine has only lately become known to engineering experts, and has only just now been made known to the general public. We shall look with interest to further details.

**COPPER STEAM PIPES.**—Discussing the subject of copper steam pipes, brought up by the explosion on the British steamer *Elbe*, the *London Engineer* recently remarked: The question deserves consideration. Why use copper piping at all? It is difficult to see what precise advantage it possesses over good lap-welded steel or iron tubes. It appears, moreover, that a very good pipe might be made of thin steel

riveted. Such a pipe could not be calked steam tight, but might be brazed steam tight, its strength depending mainly on the rivets, while the brazing would be a substitute for calking. Now that a doubt has been cast on the merits of copper for high pressure work, it is possible that some ingenious individual will produce something as new and as suitable for its intended purpose as the corrugated flues which render high pressures possible at sea.

## Artistic Brass and Bronze Works.

Owing to improved modes in the manufacture and treatment of the surface of brass, it has recovered much of its ancient prestige, not alone for the articles solely in this metal, as tables and beds, but as mountings. A perfect passion for the employment of brass, one of the least tractable of metals, prevailed in England and the continent in the last century; furniture was capped with fanciful devices in it; figures furnished and a granulated ground were inserted for panels; the fireplace reflected back from brass surfaces the glow of fire; baluster rails and pillared supports of vases and statues shone. Desks and all articles of furniture were set with inlaid brass, and boxes adorned with the metal, like the ironwork on the cistas of the Venetians. Lettered brass plates and statues with heraldic adornments were set up in churches as memorials. With less pronounced employment of the metal, brass has advantageously been applied to purposes then unthought of, as in lighted heds, while we continue its use for handles and keyhole plates and furniture drawers. But it is in combination with other metals, such as oxidized silver, in card, tete-a-tete tables, coronas of chandeliers, supports and pendants, and for curtain and portiere chains and in various mountings that artistic ingenuity has been most displayed.

## Artistic Bronze.

But there is no metal of which the past furnishes so many artistic examples as bronze. These supply a vast repertoire for the modern worker, whose business it is to study style of treatment rather than to mechanically imitate. The reproduction, however, in this composite material, on a reduced scale, of some of the finest productions of the sculptors and other artists of former times—a valued resource of beautifying interiors—has done much to spread the love of art. The latest and most ambitious efforts in bronze are on the part of certain foreign artists who are reproducing in high relief, for wall adornment, historical scenes as delineated by celebrated painters, representing groups of persons in interior. It may be questioned whether the excellence now realized in expression of human figures in bronze, as far as delineations of action, sentiment and passion are concerned, was ever before so admirably realized. One high qualification of bronze for such artistic work is the variety of tones of which the surface admits, including the most delicate gradations of shade.—*Chicago Journal of Commerce.*

**POLISHING STEEL.**—A finely polished, lusterless surface on tempered steel can be procured by either of the following operations: After the steel article shall have been tempered, it should be rubbed on a smooth iron surface with some pulverized oil-stones until perfectly smooth and even, then laid upon a sheet of white paper and rubbed back and forth until it shall have acquired a fine, dead polish. Any screw-threads or depressions in the steel must be cleaned and polished beforehand with a piece of wood and oil stone. This delicate, lusterless surface is quite sensitive and should be rinsed with pure, soft water only. A more durable polish can be obtained by first smoothing the steel surface with an iron polisher and some powdered oil-stone, carefully washing and rinsing. Then mix in a small vessel some fresh oil and powdered oil-stone, dip into this mixture the end of a piece of slider pith, and polish the steel surface with a gentle pressure, cutting off the end of the pith as it shall commence to become soiled. In conclusion, it should be thoroughly cleansed in soft water, when the article will be found to have a fine, lusterless polish.

**MONSTER LOCOMOTIVES.**—Immense as is the strength and weight of some of the monster locomotives recently turned out by the Eastern shops, it is said that the culmination of magnitude has not yet been reached. Steadily they grow, these fruitful plants of our new civilization, and there is no telling where they are to stop. It is well that we have steel instead of iron for rails, and soon it will be Ajax, Hercules, Atlas, as well as Goliath rails, and it may be an aluminum or bronze metal for trunks of lightning speed and a hundred 30-ton cars means that substantial material will be required. It is said that the new locomotive works which the Pullman Co. are erecting will engage in the manufacture of these monster locomotives.

**PACKING RINGS.**—A recent English invention relates to casting packing rings ready for use without boring or turning. The rings are cast in a chill mold around a metallic core.

The cable of the second, or North Beach and Market-street division of the Ferries & Cliff House Railway system, 19,000 feet long, has been successfully laid.



## GOOD HEALTH.

## Old Age.

The Physical Changes of Advancing Years.  
Failing Mental Powers.

In continuation of this subject from our last issue, we subjoin the following interesting series of facts through which we may learn the methods by which longevity is attained, and also those matters which are constantly striving to interfere with reaching advanced old age:

The advance of age is indicated by signs which tell unmistakably that all the powers of life are declining. Thus the ravages of disease are repaired with less rapidity than during the more vigorous periods of life, or permanent defects are left, showing the inability of the body to restore itself completely. It frequently happens that losses of substances occasioned by disease are apparently filled up as in earlier periods, but a close examination of the replacing tissues shows them to be made of inferior stuff. The occurrence of the so-called degenerations is highly characteristic of age. Chief among them are the fatty and calcareous degenerations. Fatty degeneration is especially apt to show itself in those organs most essential to health, and whose failure interferes most directly with the phenomena of life. The muscles, especially of the heart, are most disposed to this change. Little granules of fat take the place of the contracting material essential to muscular action, and the organ becomes weakened in proportion to the number of fibers which have undergone this change. The liver, kidneys, and other glands are next most often affected by a similar deposit of fat, which takes the place of the secreting cells essential to the continuance of the performance of the important duties of these glands. Fatty degeneration may, and frequently does, attack the walls of the arteries, weakening them and leading to rupture and outflow of the blood contained therein. This is the change which usually leads to apoplexy and aneurism, quite common in the aged. Such bleeding leads to death or paralysis, mostly of one or the other side of the body. When the same process attacks the arteries of the brain, it makes them brittle and leads to the easy fracture so frequently seen in old age.

Calcareous degeneration frequently follows the fatty form. When this is the case the disposition of the arteries to break and permit hemorrhage is increased. But the most characteristic of the effects produced by this change is the mechanical interference it produces in movements of different parts of the organism, especially where flexibility is necessary to the proper performance of movements. Thus the ribs, breastbones, cartilages of the ribs and the substance between the numerous small bones of which the spinal column is composed, become stiffened and rigid from the deposits of lime salts. This renders free movements of these parts impossible and may occasion much pain. When the process extends to the valves of the heart the consequences are extremely disastrous. All the serious consequences of valvular disease of the heart present themselves the same as if they were due to inflammation, and death results from heart failure. If the coats of the arteries become calcified, they may become clogged and occluded by the formation of a clot upon their inner coat (thrombosis), or they may break with little provocation, producing, in either case, paralysis or death, after the same manner as that due to hemorrhage from fatty degeneration. A somewhat similar process of degeneration may take place in the crystalline lens of the eye, producing cataract and blindness, often curable by operation.

Calcareous degeneration attacking the walls of the arteries of the brain may produce disastrous results in two different ways—by making them brittle and thus tending to apoplexy, or by encouraging the formation of clots, which, sooner or later, shut off all blood supply in the region to which the vessel is distributed. The effect of depriving a part of the brain of its supply of blood is to cause its destruction by softening.

## Softening of the Brain.

Most cases of softening of the brain occur in old age and are brought about in the manner just indicated. If the softening attacks a part of the brain whose business is to begin movements, then paralysis, or loss of the power of voluntary motion, will be an important symptom. If a part of the brain used in thinking or the formation of judgments, comparisons, etc., is attacked, then failure of the mental faculties will follow. It is a matter of common observation that softening of the brain is almost certain to show mental failure, especially loss of memory, with transitory paralysis of individual limbs at first, passing into complete and permanent loss of the power of motion in the later stages.

Not so often in occurrence, but happening without great infrequency, is "senile gangrene." This is a mortification of one or both lower extremities, which is produced in a manner exactly like softening of the brain. Thus the inner coats of the arteries become rough and rigid from calcareous degeneration. The blood deposits a clot all along the inner surface because of this roughening. Finally there comes a time when all circulation is shut off from the feet and lower part of the leg. If the veins and absorbents are open and capable of draining the dead substance of its fluids, the

parts dry up, turn black, shrivel and become mummified. This is the dry gangrene of old age. In case the drainage of the part is defective, the fluids in the dead parts undergo putrefaction, the very characteristic odor of decomposing flesh arises, sloughs occur, and the surface breaks down into foul ulcers. This is the moist form of senile gangrene.

It may be easily understood that old age is not the only cause of this condition. It may occur in early life as the result of frost-bite and other injuries greatly impairing the vitality of the tissues or of the arteries. Removal of the dead parts is the only remedy for senile gangrene. The amputation should be made through healthy tissues far above the point where the "line of demarcation" separates the dead from the living structures. This is because the arteries are always diseased a long distance from the points which are actually gangrenous.

## The Period of Decline of the Bodily Powers

Is marked by a progressively increasing loss of power to develop animal heat. This is shown by the inability to resist chilly weather and the disposition for the hands and feet to become cold. There is of the same time an inability to perform muscular exertion. These two facts are closely related, for muscular contractions are the principal source of animal heat. The appetite, as a rule, remarkably lessens, while the waste materials are also diminished in amount.

The lessened activity shows itself in the mental operations also. The mind is less vigorous, as a rule, and original works of a literary or scientific character are seldom undertaken after the age of 60. Facts submitted to the judgment may be passed upon by the sage with great correctness and discrimination, for the influence of the feelings is partly, if not entirely, removed by the effects of age. This may require time; but the value of the opinions of the aged who have preserved their mental faculties is proverbial. The slowness of mental action is perhaps due to the slow processes of nutrition which mark the workings of the nerve cells as well as those of every structure.

The physical change in all kinds of cells seems mainly to be a deposit of fat granules, in the first place, which is followed by absorption of the fat and the substitution of lime salts in its place. The deposit of either fat or lime in place of the structures proper to any part, of course, hinders the normal work that should be performed by the structure which has undergone this transformation.

The characteristic changes which go along with old age, and to which the final stoppage of the machinery of life is due, are seen to be mostly degenerations of structures in which the normal active tissues are replaced by materials of inferior quality. Fat and lime salts are very poor substitutes for the healthy, contractile muscles, or the transparent structures of the eye. It has been thought by some that if we could prevent the introduction of earthy salts into the body by way of food and drink, the rigid arteries and degenerations generally of age might be prevented. The plan proposed for thus forestalling age is as follows: Drink nothing but distilled water, or a drink containing phosphoric acid and the juice of lemons, of which distilled water is the basis. Eat no vegetable containing much of the earthy salts. This would exclude spinach, cabbage, etc., from the diet. No tea nor coffee. Take plenty of milk. A much more rational diet would be one containing but little albuminous food, plenty of milk, no eggs nor lean meat, but as much fat as can be taken without discomfort. It has been observed that calcareous degeneration is almost always preceded by chronic changes in the kidneys, and these are certainly hastened by a diet of lean meat, eggs and the like.

Many individuals have become aged long before the number of years they have seen would entitle them to the distinction of longevity. A glance at the prematurely aged may give some hints as to the means of prolonging life beyond its usual limit. Sir Walter Scott gathers many of the causes of precocious senility together in the following eloquent stanza:

Danger, long travel, want and woe  
Soon change the form that best we know;  
For deadly fear can time forego  
And bleach at once the hair;  
Hard toil can roughen form and face,  
And want can quench the eye's bright grace,  
Nor does old age a wrinkle trace  
More deeply than despair. —Marmion.

Too rich a diet—rich in albuminous food—predisposes to gout, and this to kidney disease. Indulgence in strongly alcoholic drinks has the same result. The effects of "high living" are made still more serious by deficient muscular exercise, and all of these favor the development of fatty and calcareous degenerations in the heart and arteries. "Fast living," excesses of every sort, and indolence, are among the most certain hindrances to attaining longevity.

In advanced life the lungs are especially prone to inflammation. The pneumonia of old age is excessively fatal. Even an ordinary "cill on the lungs" is liable to become a very serious matter. The ribs and breastbone lose most of their elasticity, and breathing is not so deep or so free as it is in earlier years. Hence one of the reasons for the fatality of bronchitis and catarrhal pneumonia in the aged. One remarkable fact connected with the pneumonia of old age is that it may run its course to a fatal termination and give but little notice of its presence by significant phenomena. Hence this disease is very frequently overlooked. A large

number of cases of "senile debility," "senile marasmus," "deaths from old age," are, in reality, due to pneumonia. It is proper to call such cases deaths from old age, for if this factor had been absent the disease would probably have been recognized and properly treated, the element of old age having been the really important one in determining the fatal result.

It is very likely that the constitution and tendencies inherited from the ancestry have much to do with long life. Of course, leaving all accidents, epidemic diseases, etc., out of account. Hereditary tendencies include more than mere bodily form and toughness of fiber. There are mental and emotional tendencies which are equally important in determining the length of life to be attained by the possessor. Control over the passions and the ability to foresee and guard against consequences are not less important than the possession of good digestion and a nervous system perfect in all its parts. —St. Louis Globe Democrat.

## USEFUL INFORMATION.

## Utilizing Waste Material.

Much attention is now being paid to the utilization of waste material. A few years ago the tar and other material, with the exception of coke, which form the residuum of gas manufacture was allowed to go to waste. Now, nearly every particle of such waste is utilized. So important has this saving industry become that careful estimates place the capital invested in this one branch of utilizing waste at the enormous sum of \$250,000,000. Should the gas industry cease, that amount of capital would be withdrawn from the producing power of this country alone.

Cottonseed is another large source of industry. A few years ago there was no better use known for cottonseed than to dump it on the manure heap. The annual production of cottonseed oil now reaches far up into the millions in value. Within little over a year still another important advance has been made in this industry. The residuum, after expressing the oil, has heretofore been used simply as a "meal" for feeding cattle. A large establishment is just now going into operation to treat this meal by a new chemical process by which one ton of the meal is made to give up fully ten dollars' worth of a new and more valuable oil than that obtained by the expressing process, while the meal loses nothing of its nutritive value as cattle food.

Sawdust is another material which until quite recently has been considered a worthless waste. It has now become a valuable product. In some parts of the State of Maine sawdust is dressed into convenient sizes and inclosed in barrels for convenience of transportation. In this form it can be economically shipped. This mode of packing and shipping has become quite an important business. There is a large demand for it in this form, and the future of haled sawdust is quite secure for use in stables and for various other similar purposes—particularly in cities. Everybody knows the advantages of putting hay in bales for economy in handling and transportation. It is also largely used in its natural condition, or mixed and pressed with other materials, for fuel. The amount of sawdust that is available for the purpose of haling and transportation, taking all the various lumber regions into account, is immense. The percentage of lumber that is converted into sawdust in cutting, furnishes unmistakable evidence of the large quantity of this material that is produced.

Even city garbage is turned to profitable account in many places. In the city of New York it is made to turn at least \$18,000 annually into the city treasury. There are numerous other kinds of what was formerly considered worthless waste, which are now turned to profitable account and made to afford much employment for labor.

To convert a waste material into a salable article there is generally needed only a little inventive ingenuity to discover valuable properties hidden away and adapting them to useful purposes. This general truth is becoming more and more important in almost every line of industry.

**PRESERVATION OF FLOWERS.**—The *Chronique Industrielle* says that flowers may be preserved with all their brilliancy and freshness in the following way: In a well-corked bottle, dissolve 6 drachms of coarsely-cracked, clear gum copal mixed with the same weight of broken glass, in 1½ ounces (by weight) of pure rectified sulphuric ether. Soak the flowers in this mixture, take them out slowly, and expose them to the air for ten minutes, and then immerse them anew, and again expose them to the action of the air. Repeat this operation four or five times. The flowers thus treated will keep for a long time if care be taken not to handle them too much.

**A DURABLE CEMENT.**—An account published in one of the foreign technical journals states that the cement which was employed in the restoration of the great colonnade of the Louvre, of the Pont Neuf and of the Conservatoire des Arts et Metiers, consisted of a powder and a liquid, prepared according to the following ingenious formulae: First, two parts by weight of oxide of zinc, two of crushed limestone of a hard nature and one of crushed grit,

and the whole intimately mixed and ground, either in suitable proportions being added as a coloring matter; second, a saturated solution of zinc in commercial hydrochloric acid, to this being added a part, by weight, of hydrochlorate of ammonia, equal to one-sixth the quantity of dissolved zinc, this liquid being diluted with two-thirds of its bulk of water. In the use of this cement, one pound of the powder is mixed with 2½ pints of the liquid. The cement made in accordance with this rule is found to acquire a great degree of hardness in a very short time, and possesses the advantage of uncommon strength.

**CEMENT** is a term applied to that body which is capable of uniting homogeneous or heterogeneous substances. This action may result either from chemical combination, or it may be simply mechanical, and due to the adhesiveness of the cement, by which air is excluded from the surface to be united. In the former category may be classed the hydraulic, or building cements, used in architecture and formed from the argillaceous limestones which, on calcination, are rendered capable of setting under water with rapidity, of acquiring great hardness in a short time, and of being employed without the admixture of any foreign substances. Among the hydraulic cements the most widely known are the Roman, Portland, Medina and Mulgrove in England and the Kingston and Rosendale cements in this country. Roman cement was first manufactured by Mr. Parker of London from the septaria nodules of the London clay formation, found in the Flind of Sheppy; his process, which was patented in 1796, consisted in calcining the atoms nearly to the point of vitrification and then reducing it to powder by crushing. He applied the term Roman to his preparation from its similarity to that formed by the ancient Romans from puzzolana and trass, volcanic substances nearly allied to the septaria. Portland cement is so termed from its similarity in color to the Portland stone. It is not properly a cement, but an artificial hydraulic lime composed of a mixture of clay and chalk from the valley of the Medway; the materials are ground together under water and then dried and burned in proper kilns. Portland cement is noted for its extraordinary hardness and tenacity, but as it permanently expands in setting, must not be used when such a property would interfere with the solidity of the work.

## HANDY DEVICE FOR DETECTING GAS LEAKAGE.

A handy apparatus for detecting leakage of gas from house service pipes has been devised. It consists of a small pipe bent twice at right angles, and connected with the service before and after the main cock. A small glass bulb, partly filled with a mixture of glycerine and water, is placed on the pipe. A tube dips into the liquid in the bulb, and is so arranged that any gas passing through the small pipe bubbles through the liquid. The bulb is also provided with cocks at its inlet and outlet. If these latter are opened, and the main cock closed, and the burners shut off, any bubbles in the liquid show a leakage of gas in the pipes or fixtures beyond.

## THE ORIGIN OF THE AUGER.—An item

is going the rounds which purports to relate how the auger was discovered. According to this it would appear that in 1680 an Englishman saw some boys trying to make a hole in the ground with a piece of iron barrel hoop; after the barrel hoop had penetrated some distance it became twisted and then carried the dirt up to the surface nicely; noticing this, he invented the auger. This sounds very well until you happen to think that when the boys used that barrel hoop it undoubtedly twisted the wrong way, and instead of raising the dirt to the surface had a tendency the other way.—*Ex.*

## MORTAR THAT WILL STAND FROSTY WEATHER.

Mortar made in the following manner will stand if used in almost all sorts of weather: One bushel of unslaked lime, three bushels of sharp sand; mix one pound of alum with one pint of linseed oil, and thoroughly mix this with the mortar when making it, and use hot. The alum will counteract the action of the frost on the mortar.

## A CURIOUS BIRD'S NEST.—Near the town of

Soleure, in Switzerland, a bird's nest was recently found which was constructed entirely of the imperfect watch springs thrown out from the workshops. It has been deposited in the local museum.

## TO PRESERVE LEMON JUICE.—To preserve

the juice of lemons, mix it with one-tenth of alcohol and then bottle. By this means it will be prevented from decomposing.

**GILSONITE** from Utah is being used in the East. Fifty carloads have gone to St. Louis and Chicago from Price station on the D. & R. G. W. It costs the company \$5 per ton to mine and sack it, and \$15 per ton to send it to the railway. Sacks can be used only once, and require to be of the strongest material and double sewed. Insulators for telegraph wires, made of this material nearly two years ago and in constant service at St. Louis since then, have proven to stand well and be superior in power of insulation. But it is in paints and varnishes that the chief demand comes from. For these purposes the article promises to become in such demand as to build up an immense trade.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**BIG BAR BRIDGE AND VICINITY.**—Amador *Ledger*, April 3: We learn that some of the English people connected with the Rich Gulch (Calaveras) company have taken an interest with Messrs. Tripp and Littlefield in the old Kearsing mine, and have let a contract for 250 feet of a tunnel which will tap the vein about 200 feet in depth. The work is progressing very rapidly, and in a workmanlike manner. The prospects certainly promise good results. The Cleveland Mining and Milling Co. have completed their 5-stamp mill and tested the rock, to their great satisfaction, using rain-water from One Hundred Ounce gulch. By Monday of next week they will have their ditch connected with the Amador canal, when the mill will run without delay. A tramway 800 feet in length is completed from the old shaft to the new one. We understand that Whitaker Wright, the principal owner, will be here on or about the 15th, when it is the intention of the company to erect a new 10-stamp mill, with all modern improvements, on the site at the new shaft, and make a sinking in each shaft, also build boarding and lodging house, etc. We were shown some rock taken from the South Point mine, 1500 feet north of the Cleveland, a few days ago, which looks well and shows free gold.

**PLYMOUTH.**—*Ledger*, April 3: Plymouth is very quiet. The Pacific mine has shut down again, owing to the fire, which is still burning, and in all probability will continue to burn until the mine is flooded with water. The Cupps mine is closed down, so we are informed, but for how long a time is not stated. The Monmouth is working on good prospects. The owners are very sanguine with regard to their mine, and are talking of putting on proper machinery to work with before long. The War Eagle is taking out ore that is very rich in free gold. The owners of this snug little mine have a good thing of it, making considerable more money than if they were working for the best going wages paid to miners here. The people that left and went to other mining localities have mostly returned to Plymouth, and propose to stay here if they can get anything to work at.

**SUTTER CREEK.**—*Ledger*, April 3: The rich strike at the Wildman mine continues full of promise. The ledge doesn't seem to diminish and the rock is excellent. The company are now putting up electric lights, which will be adjusted in a few days, and will be a decided improvement on the lamp system.

## Calaveras.

**HOPEFUL.**—*Angels Record*, April 3: Mining of all kinds is looking very hopeful for good results in the various enterprises now progressing. In the Beatrice the tunnel is nearing the point where the lead will be tapped, when it is expected a valuable property will be disclosed. Two shifts are working with all speed to finish the work. In the Stanislaus district work is progressing very favorably in the different mines. Mr. Goodwin's mill is running up to its full capacity. A blast was fired in the Central hill gravel claim last week and did good execution, breaking up the bank most effectually.

**CONFIDENCE.**—*Mountain Echo*, April 4: The Confidence mine in this town, bonded recently by D. H. Jones, has been freed from water during the week, and a large force of men has been put at work. The mines of Angels have thus far only been prospected, and in a few months more the developments here will be productive of great good and astonishing results.

## El Dorado.

**MOUNTAIN PEAK.**—*Democrat*, April 3: The Hard Scabble, or Mountain Peak mine, north of Latis, a tar lying idle for the past six or eight months, has again been started up, Henry Baumbach and J. C. Trahebaugh putting their shoulders to the wheel. This mine is owned by a San Francisco company, which has already expended \$12,000 or \$15,000 and has not yet taken out a cent worth of gold. The mine has been run with a gold indicator, of which Prof. Howland is the manipulator. Mr. Howland is now in this vicinity, looking up some rich mines, which it is hoped he will be able to find.

**VANDALIA.**—*Mountain Democrat*, April 3: J. W. Kelly, superintendent of the Vandalia mine, four miles below Shingle Springs, was in Placerville on Tuesday last. This mine promises great results. The mill is kept constantly running on high-grade ore from a ledge 15 feet in width. The shaft has been sunk to a depth of about 170 feet, the ore improving and the ledge widening as they go down. Expert miners who have watched the development of this property from the first are firmly of the belief that it will prove one of the richest permanent mines in the county, if not in the State.

## Inyo.

**BORAX.**—*Inyo Independent*, April 7: At the present low prices for borax the profit on the article mined in Death valley must be very small. It has to be hauled 160 miles through a desert country where every article needed by men and animals is very costly, and where high wages must be paid to workmen. The owners of the borax beds have a very large capital invested, and the region has no other resource than this. To put borax on the free list would put a stop to the work in Death valley.

## Nevada.

**THE NEW EUREKA MINE.**—*Grass Valley Tidings*, April 7: Quietly, but persistently, work on the New Eureka mine, situated near the Hebrew cemetery, has progressed for a little more than a year and is still being actively pushed. The large, double compartment shaft is now down 250 feet and co-tracks are steadily sinking. The shaft is being sunk on what might be termed a "blind lead," for there is no ledge indicated on the surface. In sinking, patches of quartz, not veins, however, have been encountered. At present the formation at the bottom warrants high expectations, although Mr. Weldon, the resident manager, does not expect to uncover the ledge he firmly believes to exist before a depth of 300 feet is attained. With Mr. Weldon are associated Senator Walrath and John Skinner. The company propose to sink other shafts along the line of their claim, which extends west to Ben

Taylor's, when the ledge shall be uncovered in the New Eureka. For this purpose the plant now on the New Eureka will be employed and water-power used in its stead. A tunnel from the "Slide" is also embraced in the project. An instance which bears out this company's expressed and unshaken belief in ultimate success is found in the fact that a portion of the New Eureka shaft costs \$50 a foot to sink. Should the project prove fruitful, the company will engage in other like enterprises in this district, which, as Mr. Weldon remarks, "is in its first stage of development." Nine men are given employment at the New Eureka, and the company owes not a dollar.

**GRANITEVILLE.**—*Cor. Nevada Herald*, April 5: The Erie mine is owned by Frank Morse of Grass Valley. It is situated about 3 miles almost due south from Eureka South. The ledge on which the mine is located runs north and south. It is nearly vertical, having a pitch of about 80 degrees. It varies in width from 12 to 80 feet. The mine has a surface area of 600 by 300 feet. The known pay-shoot is about 300 feet in length. There is about 80 tons of rock on the dump, showing gold freely, and the rock taken from that same point last year paid \$18.50 per ton, and this will probably pay as good. There is good milling rock enough in sight above the water level to keep a 10-stamp mill running two years. The rock is crushed at a 10-stamp mill about one-half mile distant. In the course of a few days there will be from 12 to 15 men at work on the mine. The ledge is on the contact of slate with granite. The White mine is owned by Frank Whitt. It is 3 miles above Washington on Canyon creek. The claim is in area 1500 by 600 feet. The ledge runs north and south and pitches east 80 degrees. It is explored in width 20 feet; how much wider it is not known. The improvements are a shaft 40 feet deep and a tunnel 107 feet, and about 70 feet more to run to reach the shaft. The whole formation will pay from \$5 to \$7, and there is good water-power belonging to the mine.

**NORTH BLOOMFIELD.**—*North San Juan Times*, April 6: The great hope of this place is that the Last Chance drift mine, owned by R. D. Skidmore and others, will turn out well. A shaft is at present being sunk to strike the lower stratum of gravel. A large amount of money has been expended thus far on the mine. It has been stated that rich gravel had been struck in the Last Chance recently, but at last accounts this was said to be a mistake. It will take some time yet to determine the character of the mine. This mine lies in the direction of Relief Hill, about 2½ miles from North Bloomfield.

**DERBEC.**—The Derbec mine, under the intelligent management of Mr. Galavotti, has about 80 men at work. The mine has been closed two months or more, but again resumed work about three weeks ago. Drifting is being pushed forward day and night in very good gravel. William M. Davis, an old San Juaner, is foreman. We have no report from the Delhi mine in relation to the March run. All we know is that the usual dividend of \$10,000 was declared and paid. The General Grant mine is looking up. Good, rich rock has been struck in the upper tunnel. The owners of the Grant are very much encouraged with the prospects.

**RICH QUARTZ LEDGE.**—*Tidings*, April 6: Of the ore taken from Chas. Hegarty's quartz claim at or near Moore's flat, sufficient can daily be reduced in a hand mortar to defray all expenses of working the mine. A gentleman who claims to know where of he speaks is our authority. Mr. Hegarty is now in San Francisco for the purpose of making arrangements for developing the property on a large scale.

## Placer.

**MAYFLOWER.**—*Placer Republican*, April 4: The last news from the Mayflower mine is that the drift to find the pitch of the rim is in over 115 feet. The bedrock was lost at 68 feet, but they will run in gravel 36 feet, and sink a winze which will probably reach the center of the channel. After that work is done the tunnel will be extended to that point and the chute built. The new mill is progressing, the engine and battery rooms being covered last week. The Live Oak continues to look well. They have found the blue gravel which was lost several months ago and which was paying \$4.25 a ton. The Live Oak mill is running.

## Shaft.

**FRENCH GULCH.**—*Shasta Courier*, April 7: John Morrell & Co. are opening up their mine in good shape and the prospects recommend it. Some capitalists are after it with a sharp stick. One cleanup of the other new mine only turned out \$80 per ton.

**PROSPECTING.**—*Shasta Courier*, April 7: During this spring, summer and fall, French gulch and other districts in this county will be so thoroughly prospected, especially on the surface, that a mineral-bearing quartz ledge will have a slim chance to escape location.

## Sierra.

**KEYSTONE.**—*Sierra Tribune*, April 6: M. H. Mead has 25 men employed at the Keystone mine. The 20-stamp mill has been put in good repair and it will be started up in a few days. It is stated that there is enough good ore now in sight in the mine to supply the mill for at least a couple of years. In the meantime another level is to be opened out. The working of this mine will aid the interests of this section a great deal.

## Trinity.

**JUNCTION CITY.**—*Cor. Trinity Journal*, March 31: Junction City, situated at the junction of Canyon creek and Trinity river, is one of the many mining towns yet surviving the early excitements. The different mines are (commencing at the southern extremity of the district): Mr. Joe Ham's, situated on the west side of the river; the mine is supplied with water from Johnston creek. A Chinese company on Lang's Bar, worked by the waters of Dutch creek; the mine employs 18 or 20 men and has been worked for 20 years or more. Alex Carr's mine on Evans' Bar is at present the only mine being worked. Soldier Bar (Chinese company) mine, supply of water from Dutch creek; number of men employed, 8 or 10—said to pay very well. The Chapman and Fisher mine next comes in order. The supply of water is from Soldier creek. This mine is well fitted up with all modern machinery, and a vast amount of earth is removed each year. Mrs. Jane Gribble runs the mine adjoining Chapman and Fisher's; water furnished by Davis gulch; from all reports this mine is the richest on the river, but the water supply is very limited. The Post mine on the east banks of the river is very little worked; it is said to

be a good mine. Sheridan Bros' mine, which gets its supply of water from Simpson's creek, has been worked for a number of years on a paying basis. The Uncle Joe Sturdivant, on the west bank of the river, takes its water supply from Mill creek. All modern machinery in shape of large pipe and giants are used, and a tunnel some 400 feet in length, through solid rock, was completed some time since for the purpose of gaining sufficient fall and dump; the mine is in good working condition. Mr. Fred Haas is steadily running a 15-inch pipe at his mine. He takes water from Clear creek, and is digging a new ditch for the purpose of working some high ground that the old ditch does not cover; about 8½ miles of the ditch have been completed. The John Whitmore mine, which is the bed of Oregon gulch, has a large compartment flume in the gulch which he extends as the tailings are removed; it will in all probability prove a success in time. The next in order is Hayes' Red Hill Gold mine. This is in reality a group of mines. The water supply is taken from Canyon creek. The mine is the largest in Trinity county and immense sums of money have been expended in bringing it to its present state of perfection. The finest suspension bridge in Northern California carries the pipe across Trinity river to the mine; 18-inch pipe is used with a capacity of about 1400 inches of water. The Segalia mine receives water from Canyon creek. The water is brought across the river in pipes over a suspension work built last fall. David Evans' Red Hill mine is supplied with water from Connor creek. Mr. Evans works quite a number of men. Mr. Henry Jacob's mine comes next; it is worked by tunnels, the main tunnel being some 600 feet in length; it is undoubtedly one of the best mines in the county and is in shape to take out a large amount of bullion. The past season has been a poor one; although a large amount of water has fallen, it went off quickly and the chances are not favorable for a wet spring.

**JUNCTION CITY.**—*Cor. Trinity Journal*, April 7: First, we will take the busy little town of North Fork, or Bagdad, as it was called. Of its earlier history we shall say nothing except that at one time it was one of the most thriving of our northern towns, and promises to be again, as the East Fork mines are developed. The wagon-road, leading to the mines, is finished about two miles above North Fork. On the hill overlooking North Fork is the Rittsburgh mine, worked with water from North Fork gulch, now worked and owned by Chinese. Crossing the river, we next come to the Miller mine, owned by Mr. Miller; this mine is a good one but with a limited supply of water from Fobbles gulch. The Idaho Bar mine is worked by Chinese. The Stoddard mine is not worked now, but there is a large ledge of ore in the mine; a 50-foot tunnel has been run, which did not pass the ledge. It may in time be one of the largest quartz ledges in the country. The owners, Lorenz & Leibbrandt intend prospecting it more. The elevator at the McGillivray ranch, owned by Lorenz & Leibbrandt, is elevating the water and dirt 49 feet. This mine is worked with water from Canyon creek. The Mammoth placer mine in the Red Hill district owned by the same parties, is worked with water supply from the Connor creek. John Waldron is running a drift close to the mouth of Canyon creek. The Pratt mine and the Thomson mine are both small mines at the mouth of Canyon creek. The old Mortzuma mine, opposite Junction City on the other side of the river, is owned by Oscar Laws; the water supply is insufficient.

**EAST FORK.**—*Trinity Journal*, April 7: Mr. J. G. Trotter, who has just returned from the East Fork mines, expresses himself as well pleased with the prospects and thinks everything favorable for a good camp in the near future. At present 3 arastras are running; Day & Moor's, Enterprise Co.'s and Bergins'. There will probably be a large influx of prospectors this summer and large developments are looked for. The wagon-road which will be completed this summer will give parties visiting the mines an opportunity to conveniently reach their destination.

## Tuolumne

**QUARTZ.**—*Sonora Democrat*, April 6: Mr. Sharwood of Soulsbyville reports a genuine mining boom up there. Messrs. Oaks & Shaw have fine prospects for a pocket on Shaw's flat hill. The Platt and Gilson mine at Soulsbyville is two feet wide, and pays steadily right along \$50 per ton. It is reported that the Riverside mine, nine miles above Columbia, is about to have a 20-stamp mill built on it. The Black Oak mine of Soulsbyville has a splendid chute—two feet in width, and is richly rewarding its owners. The mine of Mr. M. Byrum, at Rough and Ready, under the supervision of Mr. McGinn, is, we are told, doing well. The main shaft is down about 60 feet, and the quartz is of good character. In consequence of the mining and general activities in and around Soulsbyville, that village is fast becoming a thriving settlement.

**GRAVEL.**—*Tuolumne Independent*, April 7: A rich mining strike in gravel was made at American camp last week by Mr. Newcomer. From the surface to about eight feet in depth the yield of gold is large, \$8 and \$10 to the pan having been obtained. From a place about six feet square \$200 was taken out.

**GOOD ROCK.**—The Platt and Gilson mines, consolidated, are getting out very good rock. The new hoisting works are in splendid order and the mine is being rapidly developed. The future of the property is most encouraging to all concerned. Parties from below, who are interested, have recently paid the mine a visit and express themselves perfectly satisfied with the outlook.

## NEVADA.

## Washoe District.

**CONFIDENCE.**—*Virginia Enterprise*, April 7: The joint north drift run by the Confidence and Challenge on the 1200 is in 117 feet having advanced 35 feet during the week. Shipping daily to the Brunswick mill 175 tons of ore, the pulp assays from which average \$39 per ton.

**SAVAGE.**—On the 400 level the south drift has been advanced 18 feet. In the north drift have in place the 16th sill floor set. On the 500 level the started main west drift from the new station. The south drift from the 600 level upraise that is to come up with this drift is advanced 48 feet. West drift 800 level has been extended 25 feet. West drift 950 level, has been advanced 38 feet, making its total distance 312 feet. Are extracting ore from the

several levels between the 400 and 900 ft. levels, and are shipping to the Rock Point mill 60 tons per day. Battery samples average \$26 per ton.

**HALE AND NORCROSS.**—From the south drift, 400 level, are shipping out ore of good quality. On the 700 level all the stopes are looking well and yielding the usual quantity of good ore. During the week have hoisted 1530 tons of ore and have shipped to the Nevada and Mexican mills 1355 tons, the average battery samples being \$35 per ton. Have bullion on hand and previously shipped amounting to \$150,000. Have not yet received full returns from the mills for the March crushing.

**GOULD AND CURRY.**—Have extracted 85 tons of fair-grade milling ore during the week from the 250 and 300 levels, which has been stored in drifts. On the 1300 level the west crosscut from the end of the main north drift has been extended 47 feet; total, 134. The formation is porphyry with streaks of clay.

**BEST AND BELCHER.**—On the 425 level upraise No. 2 near the north line has been carried 28 feet; total, 58. The formation is clay, quartz and porphyry. Fifty feet south of this upraise have cut out a station and will start to sink a winze in some good-looking quartz there that shows value by assay.

**OCCIDENTAL.**—In the upper tunnel south drift, 50 feet from No. 1 upraise, the west crosscut has been extended 4 feet; total, 25 feet. Fifty feet from the same upraise the east crosscut has been advanced 7 feet. The north drift: the top of No. 1 upraise has been extended 10 feet; total, 41 feet.

**CHALLENGE.**—The raise commenced during the week from the Confidence raise has been continued a distance of 20 feet on the slope. The Jack Challenge joint north crosscut is in 25 feet. It is run from what is called the north lateral drift.

**CROWN POINT.**—The 400 level winze is down 65 feet, the first 40 feet being vertical and the last 25 feet on the slope to the south. The bottom is in good ore. The 500 level east crosscut is now in 218 feet, the face being in clay and porphyry.

**CHOLLAR.**—North drift No. 1, 550 level, is in 320 feet. Average assays from this drift the past week were from \$25 to \$30 per ton. The west drift from the north drift on the 450 level is now in 92 feet in quartz of low grade.

**ALPHA AND EXCHEQUER.**—Are working on the 422 and 222 levels of Exchequer, and on the 382 level of Alpha. Are chambering for a winze 100 feet north of the Alpha shaft where there is a good prospect for ore.

**BELCHER.**—The 500 level crosscut is now in 218 feet in clay and porphyry. The north drift has been advanced 30 feet; total, 48 feet. The face is in quartz and clay, the quartz assaying from \$4 to \$20 per ton.

**ALTA.**—Are hoisting and concentrating about 30 tons daily. It comes from the 825 and 1150 levels. Have over 1500 tons of ore extracted and stored in drifts and on the dump.

**KEYES.**—The south drift on the 240 level still continues cutting rich strata of ore, which are striking toward the heavy body of quartz lying on the hanging-wall of the vein.

**BALTIMORE.**—Last week some of the pumping machinery broke down, but it was soon repaired, and are again driving the north drift on the 350 level.

**UTAH.**—The incline upraise on the 472 level has been carried 10 feet; total on the slope, 133 feet. From this point are cutting out a station.

**ANDES.**—Driving a little north of east on the 350 level, and north on the 240. This upper drift has some good quartz coming in.

**IOWA.**—The McBee tunnel has been advanced 12 feet during the week, cutting through some favorable-looking quartz and clay seams.

**SCORPION.**—The south drift on the 300 level has been advanced 18 feet, being all the work done in the mine the past week.

**WEST CON, CAL.-VA.**—Shaft making good progress and sinking in vein quartz, giving some assay values.

**SEGREGATED BELCHER.**—The south lateral drift was advanced 18 feet during the week; total, 284 feet.

**POTOSI.**—The south drift on the 550 level is in 360 feet. The face is in quartz, giving low assays.

**YELLOW JACKET.**—Are shipping 100 tons of gold-bearing ore daily to the Santiago mill.

**BENTON.**—Are still drifting on the 725 level, with no new development yet to report.

**LADY WASHINGTON.**—Upraising on the 725 level, and are now up about 210 feet.

**BULLION.**—Are sinking the winze on the 500 level.

## Aurora District.

**THE DURAND.**—*Esmeralda News*, April 7: The owners of the Durand mine say that the mine never looked better than it does at present. About 300 tons of ore were recently worked at the mill, from which two bars of bullion, valued at \$18,000, were shipped to S. F. last Tuesday. The owners expect to have their new steam pump in operation by the first of May, when they will be able to work on the rich ledge of ore known to exist at the bottom of the main shaft. Ore taken from below the water-line, and which was tested, went 50 cents a pound. As soon as the water can be pumped out and the mine put in working shape, a larger force of men will be employed and the mill kept in constant operation. It is understood that men will be put to work on other mines in Aurora.

## Eureka District.

**ORE SHIPMENTS.**—*Eureka Sentinel*, April 7: During the past week ore shipment, were made from the mines of the district as follows: To the Eureka Co., Silver Lick mine, 19 tons; Dunderberg, 19 tons; Secret mine, 1 ton; Paul Pry, 4 tons; Frazer & Molino, 4 tons; Martin Horton, 3 tons. Richmond Company—Phenix mine, 53 tons; Jackson, 63 tons; Dunderberg, 50 tons; Silver West, 1½ tons. We learn that 250 tons of bluish ore has accumulated in the Ruby Dunderberg mine during the winter, which will be shipped to the furnaces as quick as Broys' teams can haul it. Five hundred tons of speiss has been taken from the Eureka Co. dump during the time of overhauling the reduction works, the resmelting of which will commence as soon as operations will be resumed.

## Gold Run District.

**ADELAIDE COPPER CO.**—*Silver State*, April 5: Messrs. Roulstone & Bates, two experienced smelt-



ers, a few years ago purchased a copper-bearing lead ten miles from Golconda. They recently commenced developing the mine, which they incorporated under the name of the Adelaide Copper Co. The lead is favorably situated on a slope of the mountains, with a good natural road from the railroad at Golconda to the mine. They sunk a shaft 35 feet deep on the lead, from the bottom of which they are now crosscutting, and have run 25 feet across the ore body without reaching either wall, the shaft and drift being in ore. There is a streak of ore averaging 15 inches wide that carries over 60 per cent copper, and which is literally covered with flakes of native silver. Assays of the ore outside this streak gave \$50 in silver and \$34 in gold to the ton. The company is building a water jacket smelting furnace of 40 tons capacity at the mine. They intend to use coke in smelting, which will cost them, delivered at the furnace, about \$20 per ton. There is plenty of water at the mine for smelting purposes, and plenty of ore in sight to supply the furnace for an indefinite period, and in a few weeks copper bars, rich in gold and silver, will be one of the regular exports of this country.

#### Garfield District.

**ATHERTON.**—Esmeralda *News*, April 7: A new ore chute has been put in at the lower tunnel of the Atherton mine. It is calculated to hold about 150 tons.

#### Hawthorne District.

**PROGRESS OF DEVELOPMENT.**—Esmeralda *News*, April 7: As the mines of Hawthorne district are being further developed, larger and richer veins of ore are being encountered. There is one peculiarly different character of ore that is to be found therein. One man may go out in the district, locate a claim and in a short time open up a valuable gold mine; another man will take off a claim adjoining No. 1 on the south, and after a little work will strike a well-defined silver ledge; then again No. 3 will risk his luck on a prospect adjoining No. 1 on the west, and the chances are favorable that he will discover a ledge of lead ore that will work 70 per cent. Then comes No. 4; he will take up a claim adjoining the first named on the north. After a few months' work he will be hauling tons of copper ore to town to be shipped for reduction. The next man will work on a prospect in the district, and before a great while he will be taking out ore that will average him \$30 per ton in gold and 40 per cent lead. Therefore, it is to be seen that when a prospector starts to work he is not certain whether he will strike a gold, silver, lead or copper mine, or whether he will open up a ledge containing a percentage of each of the above minerals. Nevertheless they are willing to take their chances, as is shown by the number of leases taken on prospects within the past month.

#### Moss District.

**COPPER.**—Esmeralda *News*, April 7: S. A. Knapp and Johnny Warner have 4 men now at work on the Black Prince mine, and are extracting very rich copper ore. They have now about 40 tons of ore on the dump.

#### Seligman District.

**NOTES.**—Eureka *Sentinel*, April 7: The Crusader mine is looking away up. Thirty more experienced miners are to be put to work immediately. Several men will be set to work in the Dead Broke mine as the spring advances. The ore in the tunnel and 40-foot levels of the Purcell mine is improving in quality. The concentrating mill and works at Seligman are rapidly approaching completion, and will probably be ready to start up in two or three weeks. The vein of the Purcell series of mines crops out for a distance of 600 feet in place of 6.0 feet, as has been erroneously stated heretofore. The north and south incline shafts on the Purcell No. 2 mine have been connected by a drift all the way in solid ore from 3 to 8 feet thick. The drift is 160 feet long, and is on the 90-foot level. The laboratory concentrator lately received here has been put in operation to test the dry process of concentration on the ground, as well as to experiment on sizing of the ore from the Purcell mines, and the success of the mill, when it starts up, is assured from the fact that from each trial only \$1.50, or thereabouts, was left in the tailings.

#### Tuscarora District.

**BELLE ISLE.**—Times-Review, April 6: North drift on east lateral from No. 1 crosscut east, 250-foot level, extended 10 feet. The stopes have yielded their usual amount and grade of ore.

**COMMONWEALTH.**—150-foot level: An upraise was started from No. 1 south drift 100 feet south of main shaft and passed through ore 10 feet, the top of raise being still in ore assaying \$26. South drift was stopped on account of the upraise, but will be started as soon as the hanging wall side of the ore is reached. No. 2 south drift has been extended 11 feet; total, 47 feet. East crosscut from the north drift has been advanced 14 feet. This crosscut was dry when run, but began to swell for a distance of 50 feet back from the face. Timbers were put in as quickly as possible, and just in when the water broke in 30 feet from the face; this relieved the pressure and is drawing the water from the upraise. No work has been done in this upraise since cutting the ore, as there was so much water. A crosscut has been run from south intermediate drift, south of the shaft, and has cut into the same high-grade ore as that north, and ore now being extracted from this point will go over \$500 per ton.

**NORTH BELLE ISLE.**—North intermediate drift from No. 1 winze, 150-foot level, extended 9 feet. The ore is wider than the face of the drift and two feet of it is very high grade. This drift will reach the Nevada Queen line in a few days. No. 1 upraise, 70-foot level, extended 7 feet. The stopes on the 300-foot level are looking well. The usual quantity and grade of ore has been sent to the mill and stored on the ore dumps.

**NEVADA QUEEN.**—350-foot level: North drift on the east vein has been advanced 23 feet, in low-grade ore. A crosscut is being run toward the footwall, from a point near the face of north drift. The ore improves some as the crosscut is advanced. The upraise has been extended up 10 feet, all in very rich ore. Chutes were put in as well as air pipes, and better progress will be made.

**PONDERA.**—Since last report fair progress has been made all around. In north drift the end of crosscut has been advanced 5 feet; ledge hard and of low grade; are not saving it at present. Started this drift on the first of the present month. South

drift from shaft No. 2 advanced 6 feet. Are taking out some high-grade ore. The ledge is getting larger and of a lower grade of chloride.

**FOUND TREASURE.**—South drift, 150-foot level, has been extended 8 feet, the face showing good ore in disintegrated quartz. Upraise No. 1 has been carried up 10 feet, and will connect with the drift on the 100-foot level during the coming week. Upraise No. 2 has been carried up 10 feet; total, 30 feet. Both raises continue to yield high-grade ore from their faces.

**NAVAJO QUEEN.**—North drift from west crosscut, 200-foot level, has been advanced 16 feet. The ledge has increased in size to 6 feet. On account of the increased width of ledge the ground has to be timbered. Everything running smoothly.

**GRAND PRIZE.**—An upraise has been started from the 300-foot level stopes. The vein continues up strong and shows splendid ore in the top.

#### ARIZONA.

**VARIOUS CAMPS.**—Prescott *Journal-Miner*, April 7: G. W. Murray is hauling ore from the Bigges mine to the sampling works. E. E. Wann, superintendent of the Elita mine, left for Cherry creek today. Ten carloads of ore have been shipped from the sampling works since last Friday. Geo. Rhoepeter has sold one-half of the Lone Pine mining claim. Big Bug, to R. H. Burnister. Robert Schofield made a cleanup a few days ago at his Big Bug mill, getting a good-sized bar of gold bullion. Dunstuckton has sold one-third of the Morning Star and Columbus mines, Big Bug district, to Dr. R. K. Robinson and F. H. Taylor. Messrs. Berrington & Harlan came in today with a bar of gold bullion from the Howard mine, making the second one within two weeks. George Merwin is said to have made a strike in the Dosoris recently, and has nearly a carload of \$400 ore ready for shipment to the sampling works. A miner, just in from the Congress mine, says the ore at the bottom of the shaft 240 feet deep, is richer and a wider body of it than at any other point. A carload of mining machinery came in yesterday, consigned to N. C. Shekels, superintendent of the Crowned King Mining Co. It will be followed soon by two more carloads. The shaft in the Congress mine is now down to a depth of 220 feet. There is a larger and better body of gold sulphurets at the bottom of the shaft than at any point in it. Eight tons of ore are now en route and will arrive at the sampling works tomorrow from this mine.

**NEW GOLD LEDGE.**—Prescott *Courier*, April 4: Jones' ten-stamp mill is doing quite well. Its manager has put a force of men at work in a new gold ledge near Mr. Barrington's house. Bank of Arizona has just shipped a \$2000 bar of gold for Harlan & Barrington. Mr. Prout, superintendent of Copper Basin, is pleased with developments. A great many miners outfit in Prescott yesterday. Mr. Cockburn, having recently returned from San Francisco, has definitely started the Arizona Sampling Works for the summer's business, since which time four carloads of ore from the Bogges mine have been run through, sampled and shipped; two carloads from Diamond Joe's Congress mine; two carloads from Moore & Doggett's Amulet mine; one carload from the Blue Dick and two mixed carloads from surrounding districts.

**TOMBSTONE.**—Epitaph April 7: Rich ore is being extracted from the bottom of the 70-foot shaft in the Southern Cross adjoining the Ground Hog. Chlorides have struck good ore in the Hard Up mine. The difficulties over the Telephone mine have been amicably adjusted. A contract has been let for a hundred-foot shaft on the Hidden Treasure, now down 35 feet in ledge matter. This week a new double compartment shaft was started on Mammoth ground to tap the large ore bodies developed below by drift in the Bunker Hill. Although every effort has been made to keep quiet the recent discovery of coal in the Chiricahua, yet enough is known to warrant the statement that coal exists there in considerable quantities. Another Cochise county resource, Rich ore was this week brought in from Morrison and Carr's claim near Atlatope springs. Quite a number went out to the strike this week and many new locations were made. Late reports from the Whittines state that the ledge has not yet been cut in the drift from the bottom of the 40-foot shaft in the South American mine, yet indications are favorable.

#### DAKOTA.

**IRON HILL SMELTER.**—Deadwood *Pioneer*, April 7: Supt. William E. Tehune of the Iron Hill smelter was in the city yesterday. The smelter has again shut down, after a run of 12 days, during which 400 tons of ore was treated. The principal portion of this ore was drawn from the Iron Hill, though other mines also contributed. The Spanish R supplied 40 tons of very excellent quality. The condition of this property is steadily improving, and more ore is now available than at any time since it has been worked.

**FLOAT.**—Thomas H. Whit, owner of the Snow Storm mill, reports that he expects to have the building erected on its new site and machinery placed within the next six weeks. Stamps will begin dropping not later than June 1st. The plant will do custom work, operating principally on ores of mines situated in Whitecloud gulch.

#### COLORADO.

**IDAHO SPRINGS.**—News, April 7: During the first quarter of 1888, ending March 31st, there were shipped to Denver from the station at Idaho Springs, 5,294,600 pounds of ore. Hubert McCoy shipped a lot of Argo ore to Denver this week. Few people are aware that within a few miles of this town is a mine of uranium of considerable value. Books & Co. are taking out a lot of fine-looking smelting copper from their tunnel, about one-half mile up Trail creek. Bell, Redd & Co. continue to show large quantities of heavy ore in the Salisbury. Mr. Morris made a 3-ton shipment from the Indiana, on Chicago creek, on Tuesday last. The ore ran very well in gold. J. C. Simmons has secured a lease of the Fraction mine. There is more ore being hauled down Chicago creek this spring than ever before. Most of it is coming from Cottonwood gulch. The Homestake up Chicago creek is looking splendidly. Some of the leasers on the Cincin-

nati up Gilson gulch have fine bodies of ore. Jim Eart & Co. are leasing on the Ship Ahoy, beyond Gilson gulch, and have one of the finest streaks of ore in that section. Electric lights are now being placed throughout the Mayflower mine. In sinking the main shaft of the Yamartine this week, an eight-inch streak of rich ore was encountered. The Freeman is turning out lots of low-grade ore. Old Seaton still holds her own. The Tropic, Casino, Victor, Kangaroo, Crystal, Metropolitan, Sarti Fe and other lodes are producing good ore. The Mountain King mine in Spring gulch started up on Monday. Contractors are driving the main tunnel on the Gen. Taylor an additional 105 feet. Lewis & Stansbury have discovered a neat little well-defined vein, carrying yellow copper and mill dirt. This lode is on the north side of Clear creek, between the mouth of Banner creek and Mill City.

#### IDAHO.

**FROM SMOKY.**—Wood River *Times*, April 4: A gentleman just back from Smoky says that the whole region generally is looking very well. At the Carrie Leonard the deep tunnel is being driven right along, while the stopes in the upper levels are showing considerable ore. At the Silver Star the shaft is still going down in good ground, and another level will soon be opened, when the mine and mill will be worked with a full force. At the King of the West the 400 level is being opened up, and shows considerable ore. At the Tyranny there are large ore bodies exposed, but the miners are devoting all their attention to making an upraise, which will thoroughly ventilate the mine. The Dollarhide group is supposed to be sold to English parties. At the Galore stormy the deep tunnel is in about 350 feet, with about 150 feet to run.

#### MONTANA.

**BONDED FOR \$100,000.**—Inter-Mountain, April 4: To-day a bond was filed for record in the county clerk's office, whereby Thos. Couch received a six months' bond upon the Harris Lloyd tunnel property, including the Pennsylvania, Johnson, and Little Ida lode claims, and a part of the Rnb Roy. The consideration named is \$100,000, half of which is to be paid at the expiration of six months and the other \$50,000 within 90 days thereafter. Mr. Couch agrees to put at least four men at work within 30 days, and has the privilege of putting as many at work as he wishes to. All ore extracted is to be held until the expiration of the bond, when its value may be applied upon payment of the bond, but if the deal is not made it shall all revert to the person giving the bond.

**A NEW DISTRICT.**—Montana *Mining Review*, April 4: Late year there was discovered near the well-known Elkhorn mining district, a new district at the old camp of Dogtown. The majority of claims located are in black limestone, the ores being galena, assaying on an average about 40 ounces silver to the ton and 50 per cent lead, besides carrying gold as high in some samples as \$30 per ton of ore. The veins show at the surface as thin seams or stringers, but a little development work shows them to be large, workable leads capped by the limestone, through which the ore protrudes in the shape of stringers as stated. The Helena, Boulder Valley and Butte railroad, running within five or six miles of the new camp, will undoubtedly insure the early and thorough development of the latest addition to Montana's already numerous array of wealth-producing districts.

**AMONG THE LEDGES.**—Phillipsburg *Mail*, April 3: John C. King, a mining operator of Chicago, is visiting James K. Pardee and taking a look at the prospects of Phillipsburg and vicinity. From the Silver Chief, the property of the Hope Mining Co., a test shipment of five tons to the Phillipsburg sampling-mill has just been made. The Hattie lode, in Dunksberg district, has encountered in the shaft at a depth of about 100 feet, two feet of high-grade silver-bearing galena. We understand this property is in process of incorporation. The Bi-Metallic continues shipments of smelting ore at a rate a little in excess of one carload a week, and without having any information concerning development and prospect we learn from authentic sources that everything is looking extremely well. Nothing definite can be learned concerning the location of the new Granite mill. The results of the numerous recent surveys have been forwarded to St. Louis, but nothing has as yet been heard from them.

**COMBINATION.**—In the tunnel on the Royal Bounty in crosscut No. 2, 150 feet from the tunnel mouth, another strike has been made of five feet of high-grade ore, much of which is free milling. This is part of the same ore body developed by the first crosscut and is known now to be of considerable extent. The mill will start to work about May 1st.

**WEST GRANITE.**—The Butte crosscut is in 535 feet in good working ground offering no obstacles to fair progress. In the east drift at the 400-foot level of the Rattlesnake the header is again widening and filling with very promising looking vein matter. While the water remains the same and gives no trouble, the work is being somewhat retarded by bad air. This, however, will be remedied as soon as air pipes can be put in.

#### NEW MEXICO.

**DEVELOPMENT WORK.**—Silver City *Enterprise*, April 9: Harvey Whitehill is one of a party of prospectors now out looking for the Adams diggings. The mine where tellurium was found by Haskell is only half a mile from Pinos Altos, and had long been worked by parties who did not suspect that it contained tellurium. The Bremen mill has shut down awaiting the arrival of quicksilver. A lot of ore from the Young Man mine was being worked which carried manganese sufficient to flour the quicksilver, considerable of which floated off and was lost before the character of the ore was discovered. James Doan this week sold ten tons of gold ore from his Dallas mine in the Burros to Crawford & Milstead. A sample was taken of a part of the ore which averaged \$50. Dave Tullock of the same camp also sold four tons to the same parties, which sampled \$40 per ton. Six men are being worked on the Last Run mine at Gold Hill. The ore is very rich in ruby silver, and has widened from 4 in. on the surface to 11 at the present depth. It is the first regular vein of ruby ore discovered in this section. Many new mines are being opened up at

Pinos Altos, and several deals of minor importance have been made recently. Four mills are running on ore. Some changes are being made in the Bell & Stephens mill, but it will be running again in a few days. The Deep Down mill will be running in a few weeks, making 6 mills in the camp, none of which will lack for ore. A partial cleanup was made in the Bell & Stephens mill Sunday last and something over \$7000 in retort was turned over to the Key manager.

#### OREGON.

**OUR MINES ABROAD.**—Bydrock *Democrat*, April 7: Never before in the history of Eastern Oregon have her mines been so thoroughly advertised abroad as we find them now. Letters from this section, many of them lengthy and fairly descriptive, are published every week by the leading journals of the State, while now and then we are favored with a complimentary notice of the same from some far-off Eastern paper.

**A GOOD SHOWING.**—There is but little doubt that a transfer of the valuable Cracker creek mines to a syndicate of Eastern capitalists will soon be a matter of record, consideration as named, \$1,000,000. These mines are located in Baker county, yield an assay of \$100 in gold to the ton, and possess every appearance of being inexhaustible. Of Mr. Bourne's recent visit to the camp, when he was accompanied by a representative of the syndicate above referred to, the Portland *News* says: "Jonathan Bourne, Jr., from the Cracker Creek mine, reports that there are some 1600 tons of rich ore on the dump. The north drift is in 320 feet and the south drift 230 feet. The exploration shows already an ore chute for a distance of 675 feet."

#### UTAH.

**REVIEW.**—Salt Lake *Tribune*, April 6: The bullion report for three months of the current year (exclusive of all ores) is as follows: January, \$327,141.43; February, \$285,687.79; March, \$283,263.98; total, \$896,093.20. A number of operators make no current reports, and are of course not included in the above. The Ontario product for the month of March was of bullion, 91,984.70 fine ounces; ore sales, \$8767.11. The regular monthly dividend of 50 cents per share, \$75,000, was paid on the 31st, making \$225,000 for the three months of this year, and the total dividends to \$150,000. The Daily output for March was 90,622.57 ounces of fine bullion; ore sales, \$12,110.92. Dividends Nos. 12 and 13 were paid on the 31st, being \$12,110.92 a share, or \$75,000. Total dividends to date, \$450,000. The receipts in this city for the week ending the 4th inst., inclusive, were to the aggregate value of \$125,759.14, of which \$93,304.45 was bullion and \$32,454.69 was ore. For the week previous the receipts were \$106,854.71, of which \$80,789.36 was bullion and \$26,065.35 was ore. The Ontario product for the week was 42,322 fine ounces of bullion; no ore sales. The Daily output for the week was 17,615 ounces of fine bullion; no sales of ore. The Horn Silver keeps up its small operations and its silence. Fine bar receipts in this city for the week were to the value of \$59,936.97. The Hansner smelter produced for the week, \$18,275 in bullion; the Germania, \$15,089.48.

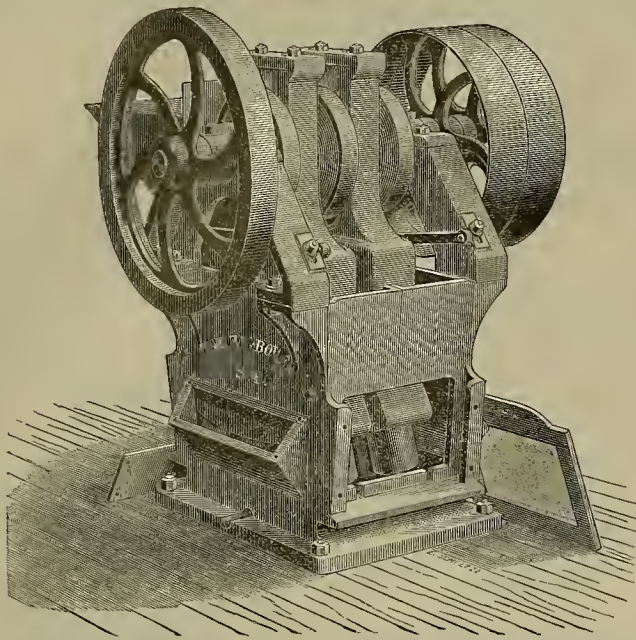
#### WASHINGTON.

**TERRITORIAL NOTES.**—Stevens Co. *Miner*, April 3: The Old Dominion mine is working a full force of men. Reports say the mine is looking far better than ever before. Several owners of properties on Bruce creek are doing their assessment work in that district. It is reported that work will be resumed on the Young America at an early date. The mine can give employment to 30 men. There are some large ledges of iron on Narcise creek, which will pay to work for the gold there is in the rock, upward of \$20 per ton having been returned by the assayer. John Koon is back from a two weeks' prospecting trip up Mill creek, where he claims there is a rich mineral field. A larger amount of work is being done on mines in Chewelah district than ever before. The Eagle mine is producing the bulk of the ore which will be shipped, and it is reported that they will ship to Colville. The smelter started up again last Tuesday with a present run of ore on hand. It is probable that when the present supply has been worked, arrangements will be made by which another month's run will be on the yards. Evan Johnson, who has been prospecting on Mill creek, brings in the news that he has made a discovery of mineral in that section on that worth big money and he will show up a silver mine there before many months. Dan Clarke and Tommy Bruhl came in from the Little Dalles district last Saturday evening, where they have been at work on the Excelsior mine. They have a splendid mineral showing and a high-grade class of ore in the mine. Harry Mumm came up from Spokane Falls last Friday, and has bled himself away to Bruce creek, where he will commence work on the Agnes and the North Star. The Agnes is a fair prospect, but the North Star has six feet of facing in galena. Henry Earne came down from his iron mine, on Clugston creek, last week. He has shipped up about 100 tons of iron from the surface. The ledge is fully 25 feet in width, and two shafts of 12 and 14 feet, respectively, show a strong indication of hard carbonaceous lead over which iron appears to be a capping. It is a sure thing that a liberal expenditure of capital on this property will develop a veritable bonanza in silver. Wm. Clousey came in from Ososyoos lake again this week on one of his regular trips. He stopped at Rock creek on his way out, and found that camp to be full of the right kind of life and everybody delving deep down into the earth for precious gold, and plenty of it. Big capital has become interested in these mines and is exerting the proper force to show up what is in them. Miners are flocking to the mines in great numbers. On his way out Mr. Clousey says he met no less than 20 parties, in one day, bound to the Northern El Dorado. In the Summit district there are several good prospects, a good mine, the Daisy, a thought a district was never half prospected. A thorough inspection is therefore necessary to prove the real value of that locality. In speaking of the Daisy, it has by far the large ore-producing capacity of any mine in the Colville country, and in real value in dollars and cents it will overshadow any other two or three properties in the Territory. We are informed that work on this mine will be resumed soon which will be an event of much interest to the camp.



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DOUBLE "ECONOMIC" STAMP MILL.



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

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Goes with each Mill. We also have a suitable

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Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to supersede the old stamp in mills of the largest capacity.

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Are now so situated with their new works as to offer to the miners of the Pacific Coast small Air Compressing Plants at such prices that almost any small mine can afford to put in power drills if they have none in use.

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Besides having the newest and lightest designed small drill plants, the Rand Drill Company, as is well known, has built, and is now building, the largest Compressor plants in this country, and has patterns for all sizes up to 40-inch diameter of cylinder.

In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

Since the reasons which formerly restrained them from the California market no longer exist, they are now in the field for the business.

SPECIAL ATTENTION is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.

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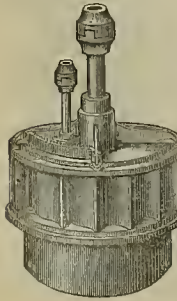
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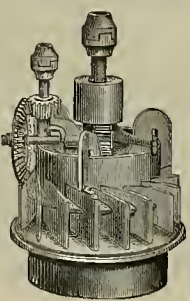
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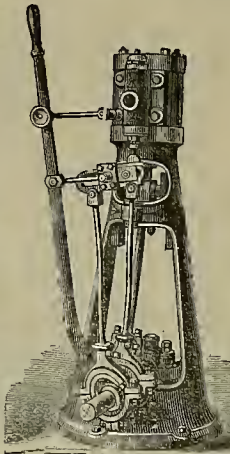
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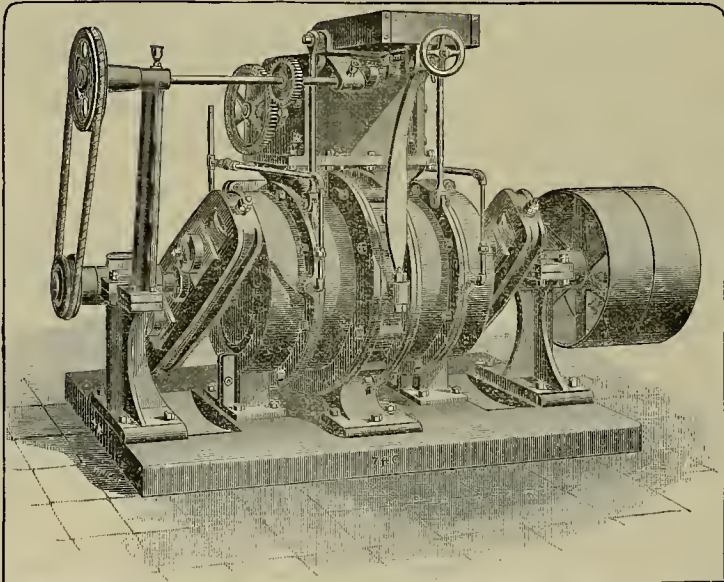
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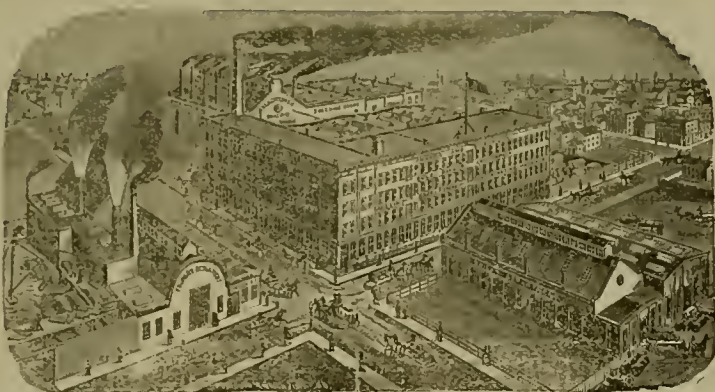
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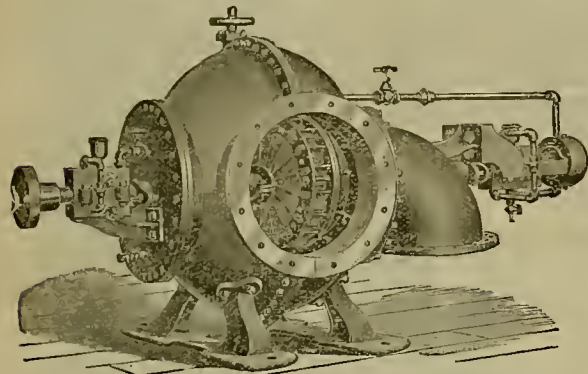
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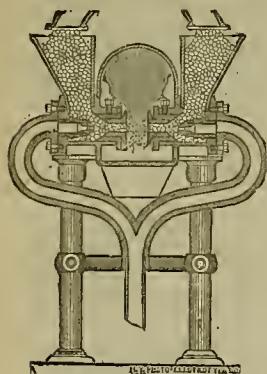
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## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 270 Market St., S. F.

FOR WEEK ENDING APRIL 3, 1888.

- 383,416.—DEVICE FOR CLOSING PURSES—Emilie N. Ames, S. F.
- 380,473.—BED-PAN—Kale M. Duffey, Atria, Oregon.
- 380,431.—TRUNK HARNESS—W. H. Gabbs, S. F.
- 380,433.—HAND-PIECE FOR DENTAL ENGINES—H. S. Grace, S. F.
- 383,435.—ELECTRIC ARC LAMP—Aug. H. Harding, Oakland, Cal.
- 380,489.—ROTARY ENGINE—Jefferis & Thurman, Lincoln, Cal.
- 380,395.—ROOF-CLIMBING DEVICE—F. Kramer, Los Angeles, Cal.
- 380,453.—TRAVELING THRASHER—R. R. Moore, Modesto, Cal.
- 380,341.—STATION INDICATOR—T. W. Monroe, S. F.
- 380,342.—TRAVELING THRASHER—C. K. Myers, Stockton, Cal.
- 380,401.—VISE—E. I. Nichols, S. F.
- 380,463.—PRESERVING GRAPE MUST AND SKINS, F. Springmuhl, London, England.
- 380,612.—HAND NAIL DRIVER—J. Weichhart, S. F.
- 380,374.—EARTH SCRAPER—Wilkinson & McCourt, Acampo, Cal.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**ROTARY ENGINE.**—A. L. Jeffers and W. C. Thurman, Lincoln, Placer Co., assignors of one-fourth to J. C. Ingram. No. 380,489. Dated April 3, 1888. This consists of an outer stationary case, an inner rotary shell or cylinder having pistons moving radially through its periphery, and a cam by which they are actuated, a stationary abutment adjustable through the outer case and fitting against the face of the inner cylinder, together with steam and exhaust passages and certain details of construction.

**TRUNK HARNESS.**—Wm. H. Gabbs, S. F. No. 380,431. Dated April 3, 1888. This invention relates to that class of devices for rapidly and effectively binding trunks, chests, boxes, etc., by means of encircling straps, and which may properly be called "trunk harness." It consists of a harness composed of two main portions, one for the top of the trunk and one for the bottom, each portion consisting of a center or centers, from which straps radiate so as to pass over the top, bottom, sides and ends of the trunk or chest, and provided with suitable fastening devices, such as buckles, rings, and straps, for the purpose of securing them all together. The object is to provide an effective "trunk harness" which may be readily applied and as readily loosened, either completely or partially, for the purpose of opening the trunk or chest.

**HAND-PIECE FOR DENTAL ENGINES.**—Henry S. Grace, S. F., assignor of one-half to Chas. W. Dicker. No. 380,433. Dated April 3, 1888. This patent covers, in a dental hand-piece, the exterior casing, the interior cylinder, within which are fitted a rotary cam shaft and spiral spring which actuates the mallet, and a spindle having the tool-holder and adjusting mechanism with an intermediate reversible connecting piece. In connection with this is a clutch mechanism by which the operative parts may be engaged or disengaged, and a means for connecting the operating parts with the flexible shaft. With this mechanism is employed a tip which may be attached or detached at will. This tip, by means of an extension at right angles with the point of the plugger, enables the operator to apply the tool so it may be operated backward or on a line parallel with the hand-piece, or at any other novel angle, thus admitting of reaching places to the teeth difficult of access.

**PLOW.**—James Porteous, Fresno. No. 380,052. Dated March 27, 1888. This is one of that class of plows in which a single beam is made to carry two plow bottoms; and the invention consists in the combination, with a single straight beam, of two plow bottoms and in the form of standards carrying said bottoms, said standards being secured directly to the beam and bent outwardly in opposite directions, whereby the requisite width between the lines of travel of the plow bottoms is obtained. The invention further consists in the novel form of the standards and in the flanges by which they are bolted to the beam. In plows of this class, where a single beam carries two plow bottoms, it is usual to bend the beam, so as to provide for the separation of the plow bottoms, and, in some cases, where a straight beam is used, blocks of wood have been bolted to the sides of the beam so as to secure the necessary separation. It is the object of this invention to secure the required width in the most simple manner and by the most effective

construction, avoiding both the bent beam and the blocks, with the straight beam, and using instead a single straight beam and bolting the standards directly to it, the separation of the plow bottoms being effected by bending outwardly the standards.

**TRAVELING THRASHER.**—Rufus R. Moore, Modesto, Stanislaus Co. No. 380,453. Dated April 3, 1888. This is a machine for thrashing and separating or cleaning grain, said machine being constructed to travel about the field, and having a receiving table and carrying belts from which the grain is delivered directly from the spout of an independently driven header which travels by its side. These receiving and carrying belts deliver the grain to the thrashing and separating mechanism, and the whole is driven directly from a central traction and bearing wheel placed beneath the machine and nearly or quite in line with the draft pole. In combination with this is a train of gearing driven directly from this shaft and means for disconnecting the thrashing cylinders and feeding belt from the gearing. A mechanism is also employed for connecting and disconnecting the wheel itself from the bearing axle, means for applying a brake to the periphery, means for adjusting and strengthening the frame of the centrally supported machine and other details of construction.

**APPARATUS FOR HEATING CARS.**—Frank J. Crouch, Oakland, Oregon. No. 380,247. Dated March 27, 1888. Pipes are placed in the upper part of the locomotive fire box and an air-pump forces air through these coils or pipes, this hot air being led in pipes through the cars of the train. A small amount of steam is also injected into this pipe to moisten the air. Large drums are placed at both ends of each car, which the hot air heats. Foot-panels are placed at the car seats, and have valves which, when touched by the foot of the passenger, allow the hot air to escape from the panels. The passengers in each seat have control of the special foot pan or warming apparatus which connects with that seat, and may turn the air into it or out at will. The train may be heated as soon as the locomotive is connected with it. There will be no danger of fire in case of accident, as there are no fires in the cars, and from the numerous pipes of distribution the atmosphere of the car may be maintained at a comfortable temperature at all times.

**SHINGLES.**—Hugh C. Henderson, S. F., assignor of one-half to N. W. Bell. No. 380,203. Dated March 27, 1888. Shingles are usually made of rectangular strips about 16 inches long, 4 to 12 inches wide, and having a thickness of about three-eighths of an inch at one end and tapering to a thin edge. The sides are intended to be parallel, but the shingles are usually wider at the thicker end than the thin end. This is a defect difficult to avoid, as the thin end cuts away more rapidly in the jointer than the thick end. When the sides taper, when laid in the usual way, the shingles are usually under or quite in contact at the lower end with a space between which gradually widens from this point upwardly toward the narrow end. Within this space dirt collects, accumulates and forms a dam which dam will sometimes be nearly up to the line of the overlapping layer of shingles which holds the water falling on the roof, causing it to set back into the space between the shingles and by capillary attraction creep up between them even above the line of the course above. The water will thus run through any cracks, nail-holes, etc., causing the roof to leak. It also causes the shingles to become damp and rot, and the nails become rusty. Even if the shingles are cut parallel, when laid there is often a receptacle for dirt and paint formed at the lower end. This invention is designed to overcome this difficulty. It consists in forming the shingles with a portion of the lower end of each edge cut away in a bevel or inclined form so as to present a diverging or widening opening at the lower end of the shingles. These new shingles when laid will have a widening space between them commencing near the lower end of the course above and opening outwardly to the exposed end of the shingles, which allows all the water that falls to run off easily.

**ELECTRIC ARC LAMPS.**—August Harding, Oakland. No. 380,435. Dated April 3, 1888. This invention relates to that class of electric lamps in which means are employed, controlled by an electro-magnet in the main circuit and an electro-magnet in a derived or shunt circuit around the arc for automatically adjusting the carbon points; and it more especially relates to an electric arc lamp patented by the same inventor Jan. 18, 1887, and in which there is employed a shaft and an electric motor tending to turn it in one direction only, said shaft being connected by suitable gearing with the carbon-holder or rod, whereby it is both raised and lowered. The invention consists in certain improvements in the means for transmitting the motion from the shaft to the carbon-holders or rods, said improvements consisting in peculiarly constructed clutches fixed upon the shaft and acting in connection with friction gears loosely joined; in swinging brackets or bangers carrying pistons forming part of the chain of gearing, and meshing with the ratchet faces of the carbon-rods, said brackets or bangers being separately and independently controlled to throw their pistons into and out of engagement by electro-magnets forming part of and peculiarly connected with the main circuit, whereby one is brought in while the other is thrown out of

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

COMPANY.	LOCATION.	No. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Andes M Co.	Nevada.	5.	05. Feb 28. Apr 4.	Apr 27. J. M. Quay.	406 Montgomery St
Alaska M Co.	California.	7.	10.00. Feb 21. Mar 26.	Apr 16. A. Judson.	328 Sansome St
Belcher S M Co.	Nevada.	34.	50. Mar 13. Apr 17.	May 7. J. Crockett.	327 Pine St
Bodie Con M Co.	California.	8.	50. Feb 13. Mar 29.	Apr 26. G. W. Sessions.	309 Montgomery St
Butte Creek Hyd M Co.	California.	12.	05. Mar 27. May 7.	May 28. J. F. Levy.	213 Market St
Champion M Co.	California.	23.	10. Feb 14. Mar 19.	Apr 16. T. Wetzel.	522 Montgomery St
Champion M Co.	Arizona.	1.	10. Mar 7. Apr 15.	May 5. P. H. Leonard.	628 Montgomery St
Crocker M Co.	Arizona.	5.	25. Feb 15. Mar 27.	May 1. A. Waterman.	309 Montgomery St
Dry M Co.	Nevada.	16.	1.00. Feb 8. Apr 9.	May 7. R. R. Grayson.	327 Pine St
Equitable Tunnel Co.	Utah.	33.	15. Feb 14. Mar 30.	May 9. C. J. Collins.	1015 Market St
Excel Iron & M Co.	California.	11.	3.31. Mar 20. Apr 31.	May 9. W. J. Stewart.	215 Sansome St
Gould & Curry M Co.	Nevada.	58.	10. Mar 12. Apr 17.	May 10. A. K. Durbin.	309 Montgomery St
Hay Eagle M Co.	California.	8.	04. Mar 6. Apr 10.	May 30. T. Wetzel.	522 Montgomery St
Kayes S M Co.	Nevada.	1.	20. Feb 15. Mar 20.	Apr 16. H. Deas.	406 Montgomery St
Kennedy M Co.	California.	3.	10. Feb 20. Apr 2.	Apr 28. L. F. Reichling.	404 Montgomery St
Live Oak Drift G M Co.	California.	8.	10. Feb 13. Mar 20.	Apr 14. T. Wetzel.	522 Montgomery St
Livermore Oil Co.	California.	2.	03. Mar 6. Apr 9.	Apr 28. H. Deas.	309 Montgomery St
Maidower Gravel Co.	California.	1.	10. Feb 11. Mar 16.	Apr 16. H. Deas.	406 Montgomery St
North Peer M Co.	Arizona.	4.	05. Feb 24. Mar 18.	Apr 23. H. Deas.	309 Montgomery St
Phil Sheridan Con M Co.	Nevada.	3.	10. Mar 7. Apr 14.	May 5. T. F. Holling.	533 Kearny St
Peerless M Co.	Arizona.	11.	25. Apr 4. May 7.	May 28. A. Waterman.	309 Montgomery St
Sierra Nevada S M Co.	Nevada.	91.	25. Apr 3. May 8.	May 28. L. F. Parker.	309 Montgomery St
Spring Valley G M Co.	California.	2.	10. Feb 11. Mar 16.	Apr 16. H. Deas.	406 Montgomery St
Trojan M Co.	Nevada.	17.	10. Mar 27. May 4.	May 1. J. F. Holling.	533 Kearny St
Virginia Creek Hyd M Co.	California.	5.	05. Feb 28. Apr 4.	May 1. J. M. Quay.	406 Montgomery St

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING DATE
Live Oak Drift Gravel M Co.	California.	T. Wetzel.	522 Montgomery St.	Annual. Apr 16
N.ajo Queen M Co.	Nevada.	J. J. Scoville.	309 Montgomery St.	Annual. Apr 28
Peabody M Co.	California.	P. E. Hilton.	109 California St.	Annual. Apr 17
Russell Reduction & M Co.	California.	J. Morizio.	328 Montgomery St.	Annual. Apr 23
Sweet Vengeance M Co.	California.	J. J. Lowes.	328 Montgomery St.	Annual. Apr 26

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A. W. Hays.	309 Montgomery St.	50	Apr 10
Eureka Con M Co.	Nevada.	H. R. P. Hutton.	306 Pine St.	25	Apr 10
North Belle Isle M Co.	California.	J. B. Pew.	310 Pine St.	50	Apr 5
Oregon Coal & Navigation Co.	Oregon.	R. B. Williams.	211 Sansome St.	1.50	Mar 2
Pacific Harax, Salt & Soda Co.	California.	A. H. Clough.	230 Montgomery St.	1.00	Apr 10
Ray Reduction & M Co.	California.	J. Morizio.	328 Montgomery St.	1.00	Sept 17
San Francisco Copper M Co.	California.	E. E. Berier.	320 Sansome St.	41	Sept 19
Standard Con M Co.	California.	J. B. Pew.	310 Pine St.	10	Apr 12

circuit; in the means for dropping either rod by short-circuiting said magnets when the arc becomes abnormally long, and in other details of construction. The objects of this invention are to improve the mechanical transmitting devices by which the power of the rotating shaft is transmitted to operate the carbon-holders or rods; to provide for operating only one at a time, the others being out of gear; to provide for dropping the rod or holders when the arc becomes abnormally long by reason of the failure of the controlling mechanism to operate, and to provide simple and effective means for hanging one rod up at the moment it disengages the other.

## San Francisco Metal Market.

WHOLESALE.		THURSDAY, April 12, 1888.	
ANTIMONY—French Star	9 @ 91		
COPPER—			
Bolt	26 @ 30		
Sheeting	26 @ 30		
Ingot	26 @ 30		
Fire Box Sheet	10 @ 26		
Iron—Glengarnock ton	— @ 30.00		
Eglington, ton	— @ 28.00		
American Soft, No. 1, ton	— @ 33.00		
Cast Pig, ton	21 @ 30.00		
Clay Lane White	— @ 23.00		
Shots, No. 1	— @ 31.00		
LEAD—Pig	5.00 @ 5.12		
Bar	5.23 @ 5.50		
Black Diamond tool	8 @ 10		
Shot, discount 10% on 500 bag	Drop, 180 @ —		
Buck, 1/2 bag	2.00 @ —		
Ohilled, do	2 @ 0		
Steel—English, lb	16 @ 20		
Black Diamond tool	10 @ 16		
Pick and Hammer	8 @ 10		
Machinery	6 @ 8		
Toe Galk	14 @ —		
TINPLATE—Goke	5.75 @ 6.50		
Charcoal	6.75 @ 7.25		
QUICKSILVER—By the Bask.	38.50 @ 40.00		
Flasks, new	1.05 @ —		
Flasks, old	85 @ —		
BORAX—Refined	7 @ —		
Powered	7 @ —		
Concentrated	6 1/2 @ —		

## New York Metal Market.

Telegraphic advices dated April 12th give the following New York prices:

BAR SILVER—38 1/2c per oz.

BORAX—34 @ 36.

COPPER—LARK—\$16 @ \$16 55

IRON—No. 1, \$22.00

LEAD—\$4.75 @

TIN—\$33.00 @

The following is the latest by mail from the "New York Metal Exchange Market Report"

COPPER—Active, spot closing at \$16.00 @ 16.50. Transferable notices (Lark) issued at \$16.80 @ 17.00.

LEAD—Dull, at \$4.80 @ 5.10 spot. Transferable notices issued at \$5.00.

TIN—Quiet at \$35.00 @ 36.00. Transferable notices issued at \$31.50 @ 32.50.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. A prompt delivery. Aus. Galena Tin, \$86.00 @ 86.25. Billet Tin, \$37.50 @ 38.00. Banca Tin, \$38.00 @ 38.25. Baltimore Copper, \$14.75 @ 15.25. Orford Copper, \$15.50 @ 15.75. P. S. C. Copper, — @ —. Foreign Lead, \$5.30 @ 5.50. Foreign Spelter, \$8.00 @ 8.12. Antimony, \$10.75 @ 11.00.

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3.00 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

JOHN G. H. LAMPADUS—S. Barbara Co.  
G. W. INGALLS—Arizona Territory.  
WM. WILKINSON—Fresno Co.  
A. F. JEWETT—Tulare Co.  
C. E. WILLIAMS—Fresno and Sutter Co's.  
R. G. HUSTON—Montana Territory.  
E. H. SCHAFFER—Sacramento Co.  
F. B. LOGAN—San Diego Co.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Mar. 22.	WEEK ENDING Mar. 29.	WEEK ENDING Apr. 5.	WEEK ENDING Apr. 12.
Albina	2.80	3.30	3.05	3.50
Alca	2.05	2.30	2.15	2.40
Andes	1.35	1.60	1.45	1.80
Argenta	1.25	1.50	1.35	1.60
Belcher	5.75	6.00	6.00	6.75
Bodie	1.00	1.10	1.00	1.10
Bullion	2.05	2.35	2.15	2.40
Baltimore	2.05	2.35	2.15	2.40
Belle Isle	1.55	1.80	1.65	1.90
Bodie Con	2.15	2.35	2.65	2.90
Benton	3.10	3.75	3.50	4.00
Bodie Tunnel	1.00	1.10	1.00	1.10
Bulwer	1.75	1.90	1.85	2.00
Con. Va. & Cal.	1.50	1.60	1.50	1.60
Challenge	1.50	1.60	1.50	1.60
Champion	5.75	6.25	6.00	6.50
Chollar	1.00	1.10	1.00	1.10
Confidence	3.40	3.50	3.40	3.50
Con. Imperial	5.75	6.00	5.75	6.00
Caledonia	1.55	1.80	1.65	1.90
Con. Potosi	6.00	6.50	6.25	6.75
Crown Point	1.00	1.10	1.00	1.10
Crocker	1.50	1.60	1.50	1.60
Central	1.00	1.10	1.00	1.10
Dudley	1.00	1.10	1.00	1.10
Eureka	1.00	1.10	1.00	1.10
Excelsior	1.35	1.50	1.40	1.50
Grand Prize	2.50	2.75	2.60	2.80
Gould & Curry	4.10	4.50	4.20	4.60
Holmes	1.00	1.10	1.00	1.10
Independence	1.00	1.10	1.00	1.10
Iowa	1.00	1.10	1.00	1.10
Jula	1.00	1.10	1.00	1.10
Kentucky	2.50	2.75	2.60	2.80
Lady Wash	1.00	1.10	1.00	1.10
Martin White	1.00	1.10	1.00	1.10
Mono	1.00	1.10	1.00	1.10
Nevada	1.00	1.10	1.00	1.10
Mt. Diablo	1.00	1.10	1.00	1.10
Northern Belle	1.00	1.10	1.00	1.10
Navajo	1.00	1.10	1.00	1.10
North Belle Isle	1.00	1.10	1.00	1.10
Nev. Queen	1.00	1.10	1.00	1.10
North G. & O.	1.00	1.10	1.00	1.10
Occidental	1.00	1.10	1.00	1.10
Potosi	1.00	1.10	1.00	1.10
Peerless	1.00	1.10	1.00	1.10
Perr	1.00	1.10	1.00	1.10
Silver Star	1.00	1.10	1.00	1.10
Savage	1.00	1.10	1.00	1.10
S. B. & M.	1.00	1.10	1.00	1.10
Sierra Nevada	1.00	1.10	1.00	1.10
Silver Hill	1.00	1.10	1.00	1.10
Silver King	1.00	1.10	1.00	1.10
Scorpion	1.00	1.10	1.00	1.10
Syndicate	1.00	1.10	1.00	1.10
Union Con	1.00	1.10	1.00	1.10
Yellow Jacket	1.00	1.10	1.00	1.10

## Sales at San Francisco Stock Exchange.

WEDNESDAY April 12.		50 Iowa		1.35
350 Alpha <td>2 60</td> <td>150 Justice<td></td><td>1.40</td></td>	2 60	150 Justice <td></td> <td>1.40</td>		1.40
100 Alta <td>2.05</td> <td>100 Keyes<td></td><td>2.00</td></td>	2.05	100 Keyes <td></td> <td>2.00</td>		2.00
270 Andes <td>1.50</td> <td>300 Mexican<td></td><td>.55</td></td>	1.50	300 Mexican <td></td> <td>.55</td>		.55
400 Archa <td>2.50</td> <td>100 Mt. Cory<td></td><td>2.00</td></td>	2.50	100 Mt. Cory <td></td> <td>2.00</td>		2.00
100 Baltimore <td>2.05</td> <td>60 Nev. Queen<td></td><td>.20</td></td>	2.05	60 Nev. Queen <td></td> <td>.20</td>		.20
280 Belcher <td>7.00</td> <td>10 N. Belle Is.<td></td><td>.64</td></td>	7.00	10 N. Belle Is. <td></td> <td>.64</td>		.64
400 B. & Belcher <td>5.25</td> <td>225 Ophir<td></td><td>.90</td></td>	5.25	225 Ophir <td></td> <td>.90</td>		.90
200 Bullion <td>1 9</td> <td>390 Overman<td></td><td>2.60</td></td>	1 9	390 Overman <td></td> <td>2.60</td>		2.60
250 Caledonia <td>.60c</td> <td>100 Peerless<td></td><td>1.40</td></td>	.60c	100 Peerless <td></td> <td>1.40</td>		1.40
50 Crown Point <td>.85</td> <td>600 Potosi<td></td><td>.42</td></td>	.85	600 Potosi <td></td> <td>.42</td>		.42
200 Challers <td>.85</td> <td>600 Savage<td></td><td>.42</td></td>	.85	600 Savage <td></td> <td>.42</td>		.42
300 Con Va & Cal <td>.14</td> <td>200 Scorpion<td></td><td>.75c</td></td>	.14	200 Scorpion <td></td> <td>.75c</td>		.75c
150 Crocker <td>.90c</td> <td>300 S. E. &amp; M.<td>5.12</td><td></td></td>	.90c	300 S. E. & M. <td>5.12</td> <td></td>	5.12	
250 Caledonia <td>.60</td> <td>270 Sierra Nevada<td></td><td>4.65</td></td>	.60	270 Sierra Nevada <td></td> <td>4.65</td>		4.65
50 Crown Point <td>.50</td> <td>100 Silver Hill<td></td><td>.60c</td></td>	.50	100 Silver Hill <td></td> <td>.60c</td>		.60c
100 Excelsior <td>1.75</td> <td>120 Union Con<td></td><td>4.60</td></td>	1.75	120 Union Con <td></td> <td>4.60</td>		4.60
350 Gould & Curry <td>4.15</td> <td>100 Yellow Jacket<td></td><td>1.30</td></td>	4.15	100 Yellow Jacket <td></td> <td>1.30</td>		1.30
100 Grand Prize <td>2.60</td> <td>250 Weldon<td></td><td>.70c</td></td>	2.60	250 Weldon <td></td> <td>.70c</td>		.70c
610 Hale and Nor <td>.90</td> <td>250 Yellow Jacket<td></td><td>.85</td></td>	.90	250 Yellow Jacket <td></td> <td>.85</td>		.85



## Mining Share Market.

The fact that the Comstock is turning out more bullion monthly than it has for years does not seem to have very much effect on the stock market. The activity in the mines is by no means followed by activity in stocks. The most important news from the mines is from the Jacket-Challenge north drift, being run on the 1000 level of Jacket to meet an incline upraise from Confidence through the Challenge south ground. The Virginia Enterprise says: The strike was made at a distance of about 200 feet in. This ore body is believed to be the northern continuation of the ore which was being worked from the 800 level of the Jacket at the south end when the big fire of April, 1869, occurred, when so many lives were lost. There has not been a pick in those diggings since. At that time the mine was paying monthly dividends of \$5, and it cost \$18 per ton for reduction and \$2.50 for hauling. The mill returns were also poorer than now. Striking the ore at that point on the 1000 level traces it with some degree of certainty from the 800 level toward the south end, the 1000 at the north end, the 1100 winze of Confidence and the 1200 of Challenge, revealing a steady inclination of ore body all the way.

The milling situation counts pretty satisfactorily for the duty of the boom. The failure of the wire-rope system of transmission at the C. & C. was the first staggering blow inflicted on the situation. But this will all be mended. The wire-rope system will be made a success and the Nevada mill will make the necessary changes in its process of amalgamation to successfully mill the ores on which it is running.

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco: SONOMA VALLEY LAND CO., April 7. Capital stock, \$1,000,000. Directors—A. D. Bacon, F. P. Bacon, I. C. Stamp, F. B. Hooper and Geo. H. Maxwell.

MAGALIA AND BUTTE M. CO., April 7. Location, Butte county, Cal. Capital stock, \$10,000,000. Directors—A. Abbott, N. L. Leunham, Varney W. Gaskill, A. E. Shattuck and J. F. Fassett.

KAWEAH RIVER AND GIANT FOREST R. R. CO. Object, to construct a road from a point near where the Kaweah river crosses the section line running north and south between sections 16, 17, 20, 21, 28 and 29, in township 18 south, range to Giant Forest, in Tulare county. Capital stock, \$300,000, in 5000 shares. Directors—W. S. Runyon, Jas. A. Waterman, Wm. B. Lake, Alva Udell and M. S. Eisner.

MIDLAND R. R. CO., April 10. Object, to construct and maintain a railroad from a point near the proposed terminal of the Kaweah River and Giant Forest Railway to the most favorable point of intersection with the Southern Pacific Railroad in Tulare county. Capital stock, \$180,000. Directors—W. S. Runyon, Jas. A. Waterman, Wm. B. Lake, Alva Udell and M. S. Eisner.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Savage, April 7, \$15,000; Cons. California and Virginia, 7, \$130,844; total for March, \$420,485; Mount Diablo, 5, \$5548; Alice, 5, \$24,960; Moulton, 5, \$9600; Hale and Norcross, 10, \$15,000; Standard Cons., 10, \$6172; North Belle Isle, 10, \$22,000; Hanauer, 5, \$1900; Germania, 5, \$3558; Hanauer, 6, \$1950; Germania, 6, \$1720; Hanauer, 6, \$1950; Moulton, 7, \$3552; Argus, 7, \$7819; Hanauer, 8, \$1765. During the week ending April 7, inclusive, mineral shipments out from Salt Lake City were as follows: Fifteen cars bullion, 367,726 pounds; 39 cars silver and lead ore, 1,211,545 pounds; 4 cars copper ore, 129,800 pounds; 2 cars matte, 58,200 pounds; total, 60 cars, 1,767,271 pounds.

CHINAMEN are cleaning and putting ditches in repair preparatory to their spring operations in the placers at Tuscarora, Nev.

## ASSESSMENT NOTICE.

## Butte Creek Hydraulic Mining Company.

Location of principal place of business, San Francisco, California. Location of Works, Butte county, Cal. NOTICE is hereby given, that at a meeting of the Board of Directors, held on the 27th day of March, 1888, an assessment (No. 15) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary at the office of the company, No. 213 Market street, San Francisco, Cal. Any stock upon which this assessment shall remain unpaid on the 7th day of May, 1888, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on Monday, the 25th day of May, 1888, to pay the delinquent assessment, together with costs of advertising and expenses of sale. By order of the Board of Directors. LOUIS R. LEVY, Secretary. OFFICE—No. 213 Market street, San Francisco, Cal.

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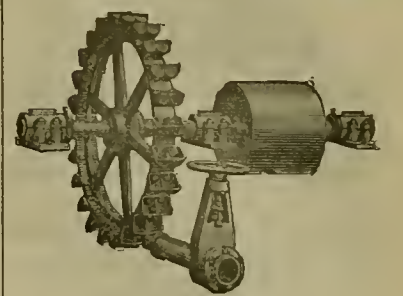
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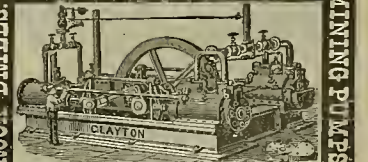
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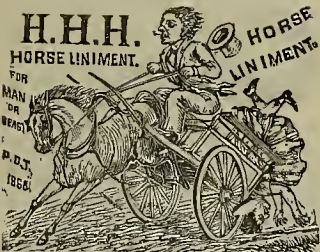
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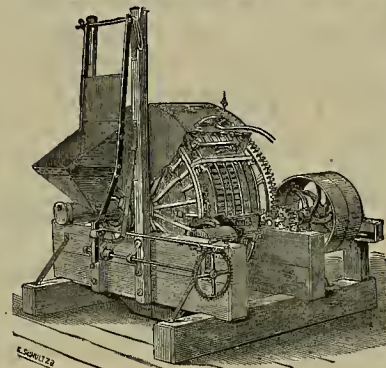
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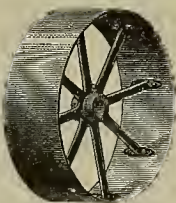
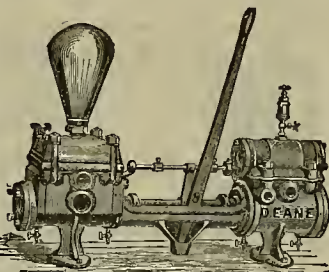
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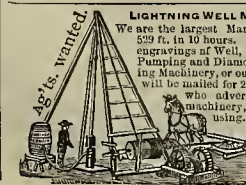
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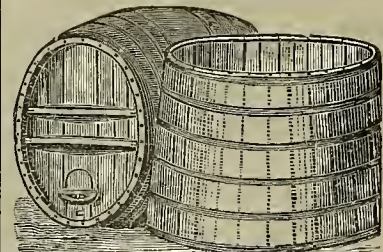
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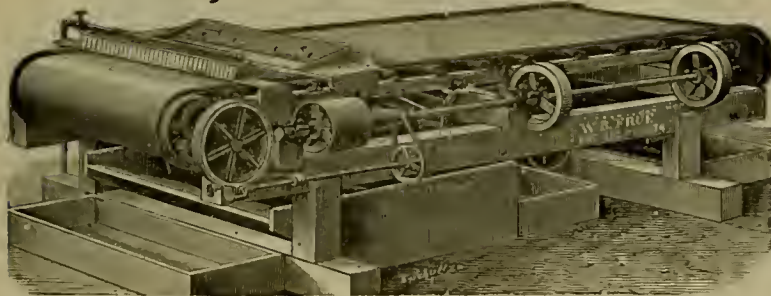
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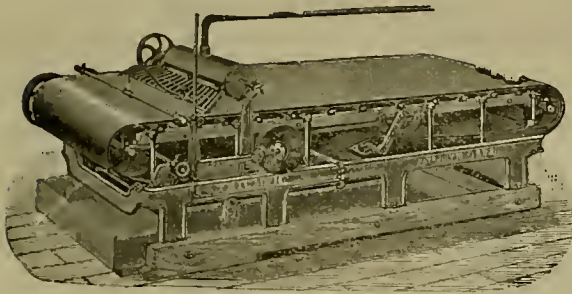
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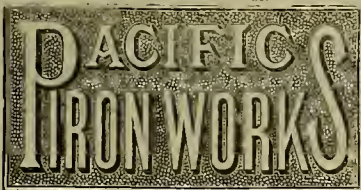
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California Cotton Mills, East Oakland.	1 150 H. P.	Selby Smelting Works, Vallejo Junction.	1 75 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
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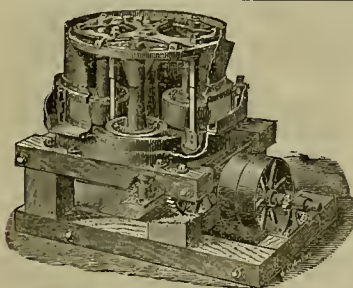
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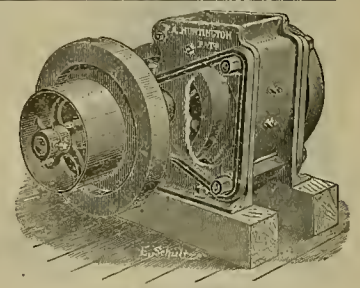
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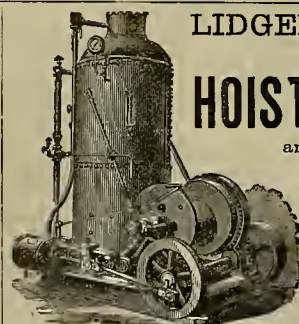
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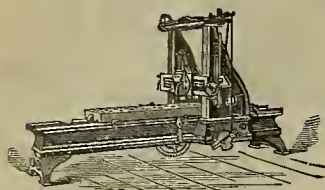
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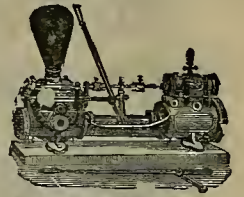


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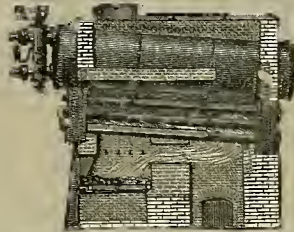
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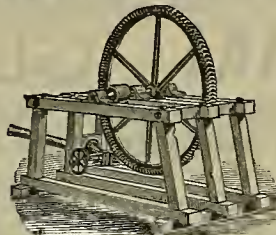
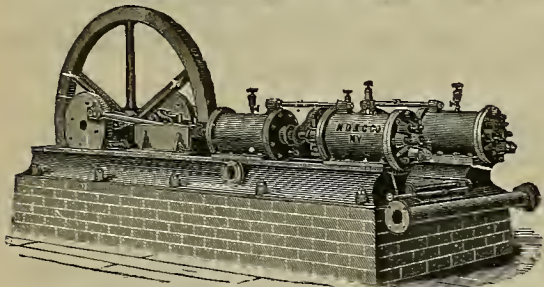
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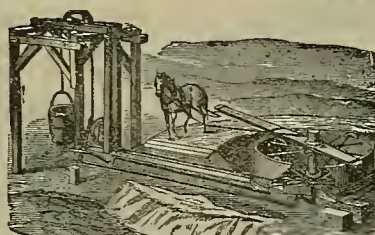
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NOTICE.—Mining men are cautioned against fraud in purchasing poor mining plates made in this city; they have proved defective in the Silver-plating, and in having much less Silver than was contracted for. When in doubt make an assay; thin, light Silver-plating looks the same as heavy. SEND FOR CIRCULAR.



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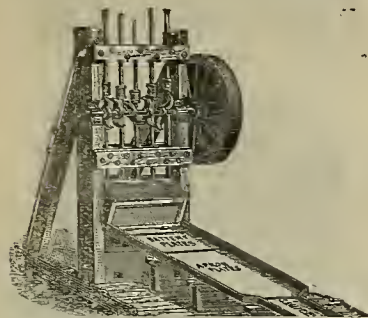
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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, APRIL 21, 1888.

VOLUME LV  
Number 16

## The Gates Ore Crusher.

The engraving on this page represents the Gates ore crusher, a machine which has been used for some time in the East for crushing macadam, rock, etc., and in Montana and Colorado for ore. It has not been used much on this coast, but Rankin, Brayton & Co. of the Pacific Iron Works now have the agency here. They recently shipped one for fine ore crushing to the Wenban mine, Cortez, Nev., and another is going to the Palmetto mine, Nev.

The engraving shows the construction of the machine. It is not exposed to one-fourth the strain that comes to other crushers, because the whole surface of all other crushers' faces come in contact with stone or ore, while not one-tenth of this crusher's face can strike ore at one time, being on a circle.

The top of the shaft is stationary, while the bottom is placed in the hub of the gear wheel, about half an inch out of center; this gives the shaft a gyratory motion, like holding a pencil at the top with your finger and thumb, and then moving the bottom around in a circle. There is positively no grinding motion, and so but little wear. One set of chill faces have been in constant use for two years, and are not half worn out. The continuous crushing gives this breaker the advantage over the jaw-crusher that a rotary saw has over the up-and-down saw.

The crushing head does not revolve like a bark-mill or coffee-mill (as many suppose), but while the shaft at the top is held, the shaft has a gyratory motion; but not a rotary motion, not a vibratory motion, but a continuous motion. This gives great capacity.

By being able to do finer work than an ordinary crusher, the capacity of a quartz-mill is increased. All work that can be done by a crusher is done more cheaply than in a battery, and as this crushes the ore fine, and continuously, the stamps have less to do with its product than they do with coarser ore. They have one of these crushers at the Homestake mine, Dakota, that they call the Big Jumbo, of a capacity of 100 tons an hour, and does the crushing for several mills. It is run by separate power at the mine itself, and not at the mill, which has become the practice in large operations. The crushed material is afterward distributed at the mill.

In some places in the East, very large machines of this type are made. There is one on the Burlington road, not far from Chicago, where 1000 tons of rock are crushed per day for railroad ballast. It takes a five-ton carload at a dump. These machines are also made specially for quartz work, and are arranged for either coarse or fine crushing. They have a very large wearing surface, and the size of

product can be regulated by raising the shaft. The head or concaves do not have to be changed to effect the size of material. This machine discharges freely, and there is no danger of its choking. By a peculiar safety device, there is no danger of breakage by sledges or other hard substances getting in by accident. The crusher has a very large capacity, though it requires comparatively little power.

A DISPATCH from Seattle, Washington Territory, dated April 18th, says: A rich discovery

LIQUID FUEL FOR STEAMERS.—On recommendation of Supervising-Inspector Lubbok to Inspector-General Damont, that petroleum is not safe fuel for large boilers, the Secretary of the Treasury directs that all permits for its use be withdrawn in this district, except for small steam launches. Inspector Lubbok claims that the heads of some of the stay-bolts on the side of the fire-box of the steamer Oakland were nearly hurled off, and a few hours more use would have caused a disaster. This seems strange in view of the fact that the late General

## California Slate.

We have been shown some very excellent sheets of roofing slate from the Chili Bar slate quarry, belonging to W. D. Perine and G. J. Mothersale. The quarry is on Chili Bar, south fork of the American river, El Dorado county. It is the only slate quarry really opened and being practically worked in the State. There is another in the same vicinity, but not yet opened. The Chili Bar quarry has 60 or 70 "squares" (of 100 feet each) now ready for

shipment, and more is being quarried and split. Some have already been furnished for Napa and Merced.

Very large sheets may be obtained, but those which we have at this office are 22x12 and 18x10. The blocks are blasted out and then the sheets are split with a chisel. There is plenty of slate in El Dorado county, but it is difficult to find exactly the right kind for roofing purposes. Mr. Mothersale says he has been some 12 years looking for good slate in California and this is the only quarry of fine-grained material he has been able to find. It is of good dark color and fine grain, and will do for roofing purposes, mantels and billiard-table halls. If prepared and planed, it will serve for school slates also. Our informant has been in the slate business for 30 years, and the Chili Bar slate is as good as he ever handled. He slated the Hopkins mansion, the Lane Institute, the Deaf and Dumb Asylum and other buildings.

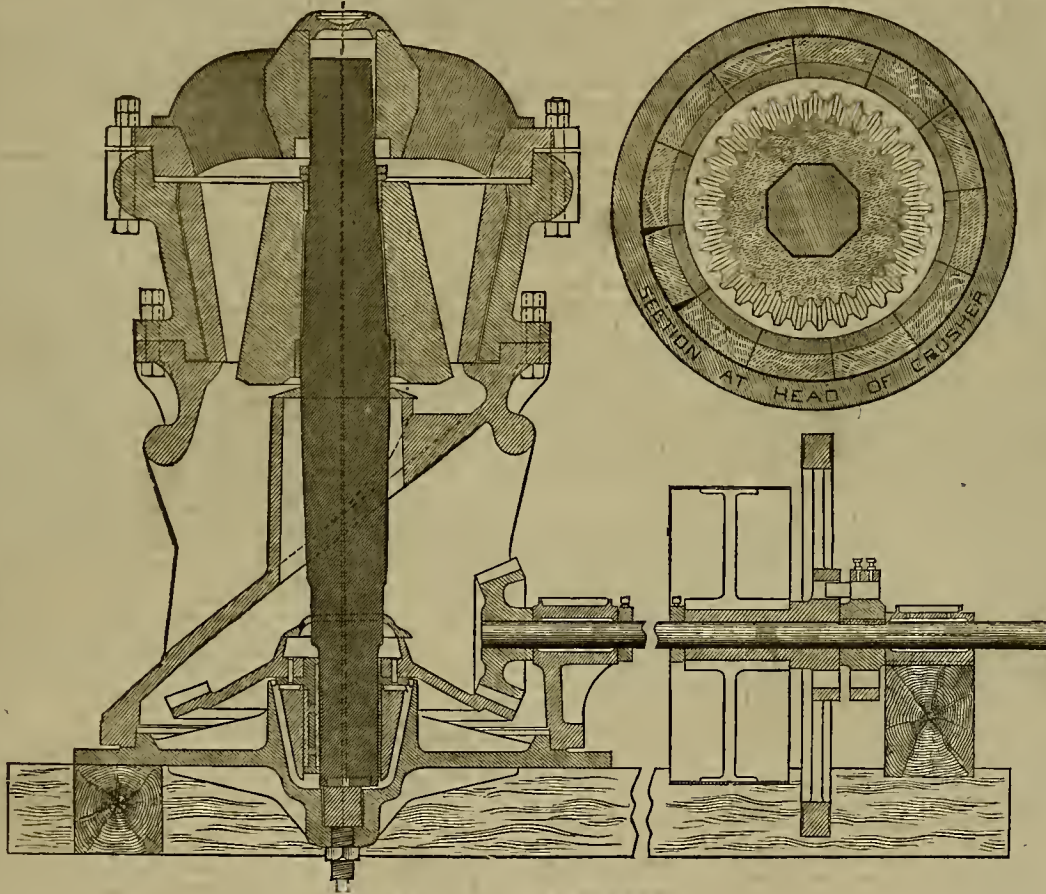
Work on the Chili Bar quarry was started up about eight months ago, but the cost of shipment to Shingle Springs is expensive; in a week or so, freight trains will run over the new railroad, and a better market for the product will result. They will be able to furnish the slate very cheaply in the

future. However, redwood shingles are so good and so lasting that it will be difficult to introduce slate roofing except for the best class of houses.

This California slate is superior to most of the Eastern, being so fine, smooth, and good. When first quarried it is easily split. They have readily split 15 sheets out of a block three-quarters of an inch thick. It is tough, and does not easily break, nor does it crack at all when the nail-holes are punched. In fact, the sign at the quarry is made from a sheet of slate, the letters having been easily punched out without any breakage of the sheet.

THE Carlisle Gold Mining Co. of New Mexico recently paid a dividend of \$50,000 in London, equal to 25 cents per share, and making a total of \$250,000 to date.

JAMES SALOMAN, working in the St. Lawrence mine, Butte, was killed by an explosion of powder on Wednesday last.



THE GATES ORE CRUSHER.

of copper ore was made at Discovery bay yesterday. Samples are pronounced to be of an unusually fine quality, and the vein from which it was taken is eight feet thick.

MICHIGAN is credited at least with one gold mine, known as the Ropes. Its product for the year ending March 1, 1888, was \$28,940. The expenditures for the year were \$76,084, of which \$40,000 was obtained by assessments.

It is stated that a New York corporation is making all necessary arrangements for the construction of a furnace at or near Luning, Esmeralda county, Nev.

A CORPORATION was formed at Stockton Saturday to mine gypsum in Nevada and mill it there, making Stockton the company's place of business.

A PIONEER miner named John Burton committed suicide at Downieville on Wednesday, by exploding a giant powder cartridge on his breast.

Master-Mechanic Stevens and Capt. Foster were both of the opinion that the oil fuel was less trying on boilers than ordinary coal. Inspector Lubbok is to personally investigate the Julia disaster and report in full to the Supervising Inspector-Generals.

ALVAN G. CLARK, who made the great 36-inch lens in the Lick telescope, is already considering the matter of a 40-inch lens, although the scheme has not yet taken definite shape. The cost of a 40-inch lens would be about \$100,000.

MANUS McBRIDE, superintendent of the Pittsburg coal mine at Somersville (Mt. Diablo mines), was shot on Monday by one of the miners while in a dispute on pay-day. The wound is not fatal.

DURING the month of March, seven mines in the Lake Superior district, Michigan, produced 4056 tons mineral, equivalent to 6,000,000 lbs. ingot, against 6,200,000 lbs. ingot for the same month last year.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—EDS.

## El Dorado County Mines.

EDITORS PRESS:—In the early history of quartz mining in this county, it was the prevailing opinion that the gold was principally found near the surface of the ground, and that the gold-bearing quartz veins extended to no very considerable depth. The consequence was that all the prospecting was done near the surface, and if a "bonanza" was not immediately unearthed, the work was suspended and the ledge pronounced of no value. The theory for this conclusion was that the placer mines having been very rich in almost every mining camp in the county, the gold must have come from the surface deposits. Recent operations, however, by some of the more sanguine and energetic miners, have tended to displace this theory, and the result of such operations is proving most satisfactory to all interested in the mines of this county. During the great excitement of 1862 and '63, thousands of "pot-holes" were sunk in all parts of the county, wherever the sign of "croppings" could be found, only to be abandoned after the expenditure of a few hundred dollars and a few months' hard labor. But now the scene is changed, and after two decades

## These Old Locations

Are all being looked up, and prospecting in a scientific and systematic manner is beginning to develop numerous valuable ledges to the immense satisfaction of their owners. We shall not attempt in this brief communication to enumerate a great number of these claims, our purpose being only to show that the gold is not all upon the "outside," but that on the contrary the veins increase in richness as greater depth is attained. We had occasion to visit the Vandalia mine, on French creek, a few days since, and were much pleased with the outlook of this mine. The company have just placed in position two Frue concentrators which were doing excellent work, and we were assured by the gentlemanly superintendent that they were exactly the thing, inasmuch as the sulphurets contain much fine gold, which it was almost impossible to save by means of amalgamated plates alone. Said he: "We are now down 170 feet, and still going, and as we get deeper on the vein the richer it is, and we intend to continue to sink and develop our mine, which we are fully convinced is valuable property." They have at present only five stamps running, but will add more as occasion may require. The engine is of 40-horse power, and the mill is put up in the best possible manner, with a view to its enlargement as the work progresses.

## The Shaw Mine

On Indian creek, two miles northwest of El Dorado, is being worked with good results. This mine, famous for its rich pockets, is running its mill to its fullest capacity, and we learn that a new and much larger mill is now being placed on the mine, and will be in running order in a short time. This mine is paying well and promises to become a veritable bonanza to its owners. The Starlight, about two miles southwest of El Dorado, is one of the best developed mines in this vicinity. The company has several inclines run to a depth of 200 to 400 feet, from which drifts are run in all directions, and all showing rich milling ore. Not less than 10,000 tons of ore may be seen piled upon the dumps ready for milling. No mill has yet been erected on this mine, but we learn that it is the intention of the company to build a mill in the near future.

The Pyramid mine on Dry creek, owned by Messrs. D. C. W. and J. W. Hodgkin, will resume work about the 1st of June. This is one of the largest veins of quartz in this portion of the county, the main shaft, 140 feet deep, showing a 16-foot ledge at the bottom with excellent prospects.

The Pine Hill Gold and Silver Mining Co. (incorporated) have started a new double-compartment shaft on their mine on Pine Hill, and we are informed that they intend to sink a perpendicular shaft 200 feet deep, from which a crosscut will be made and the vein thoroughly prospected. The original shaft was sunk to a depth of 50 feet, developing a very large body of sulphurets ore rich in free gold, and also containing a good percentage of silver. Their present shaft will be thoroughly timbered in the most approved manner and will be second to none in the county. The work of sinking will be commenced on or about the 1st of May. Many other valuable properties might be enumerated, but we will mention only one, which we think must prove to a demonstration that the mines of our county are not all on the surface. We refer to

## The Springfield

Located about two miles southeast of El Dorado. This mine is, perhaps, one of the best in the county to-day, because it is the best developed, but we have no reason to doubt that the mines we have herein mentioned will prove equally as valuable when they have been equally as well developed. The genial superintendent, Mr. Poundstone, greeted me cordially on our visit to the mine a short time ago, and kindly gave us all the information we desired concerning the workings, machinery, levels, depths, etc., and upon our signifying our desire to see the "bottom" of the mine, he generously

ly granted us that privilege, and at seven o'clock P. M. we found ourselves in company of the underground foreman—a thorough miner and gentleman—descending the shaft at a gradual pace, and soon we were halted at the 1000-foot level, where we were shown through all the drifts and stopes, and made acquainted with the various ways and means of underground mining. After spending some 20 minutes or more, we were lowered to the 1200-foot level, thence to the 1400-foot, and finally, to the 1600-foot level, at each of which places we were conducted through the various drifts and stopes where we had a splendid view of the vein in its various forms and beauties. The vein has a uniform width of about four feet, and is of a bluish-white color, and maintains about the same appearance throughout its entire depth, and we do not see any reason why it may not continue an unlimited depth without any material change, except that it may continue to increase in richness. We were informed by the superintendent that it was his intention to still continue to sink, and demonstrate the fact that our mines, to be valuable, must be prospected to a greater depth than has heretofore been the custom. The Springfield is equipped with a 10-stamp mill, and all the machinery is run by hydraulic power under a pressure of nearly 400 feet. Burleigh drills are used, and the entire machinery is of the best quality, and every department of the mine shows that great care and good judgment are exercised in the management. We believe the time is now at hand when those seeking to develop our mines must and will adopt the course pursued by the management of this property, and whenever they do, the people of El Dorado county will begin to see a repetition of the glorious days of '49. A MINER.

Shingle Springs, El Dorado Co.

## "The Matting Process."

EDITORS PRESS:—In your issue of March 31st, some one, wisely obscuring his identity under "J," attacks my paper on "Matting Dry Auriferous Silver Ores" in a manner which shows that he has not thought it necessary to acquaint himself with its contents before offering criticism.

To any one who has taken a sufficient interest in the subject to carefully read the results of our experiments at Toston, it will be evident that this protesting "J" has been a trifle "previous" in his remarks, in fact that even a superficial knowledge of the subject would not come amiss to him.

In 1875 Prof. Egleston gave us a detailed account (see Transactions of the American Institute of Mining Engineers, Vol. IV) of the "Boston and Colorado Smelting Co.'s" works and operations, to which establishment "J" refers as a brilliant example of the concentration of the precious metals by means of an iron matte (sic) and there is probably hardly a Western metallurgist who has not at some time visited these works, or is not fully acquainted with the processes in use there, excepting perhaps their method of separating gold from copper.

This Colorado matting process was known to me from personal examination made some years previous to the Toston experiments. Probably if "J" had not been so much "impressed" by what appears to have been his first introduction to a modified gas-producer, he would have observed at the Central City establishment that the precious metals are concentrated in a matte carrying from 25 to 30 per cent copper. Now collecting gold and silver in a copper matte as practiced at Butte, Denver and elsewhere, is a very different matter (no pun intended) from using an iron matte—sub sulphide of iron—(?) for that purpose, as my "metallurgical brother" will discover if he ever makes a practical acquaintance with the subject.

At Toston we attempted to collect the gold and silver from silicious non-smelting ores by fusing them with iron pyrites (FeS<sub>2</sub>), and I have still to learn of this process having been put into use elsewhere in the United States previous to the publication of my paper.

The "vague rumors" referred to experiments made, I believe, in Saguache county, Colorado, by some one whose name I could not ascertain.

Toston, M. T.

W. L. AUSTIN.

## Wickes, Montana.

EDITORS PRESS:—Wickes is the location of the Helena Mining and Reduction Co.'s smelter and works, and since Governor Hauser and his party have taken hold it has been actively operated, and I believe has paid fair interest. They have been having more ore than they knew what to do with for the past year. With the production of their own mines, the Alta and Comet, and the large shipments constantly arriving from the Cœur d'Alene district, they have not been able to keep the smelter running constantly; not on account of lack of ore, but rather on repairs. It is very unfavorably located for various reasons. The most forcible of these is their shortness of room, and their water facilities are very poor, so that it is really discouraging for a company to spend any large amount of money in a place when they are hampered for room as they are now. The Minah mine, owned by Messrs. Briscoe & Sites, is making regular shipments of ore, and has been

continuously for nearly two years. Their ore yields handsome returns. The amount of the product for 1887 I did not learn, but the shipments during seven months of 1886 aggregated over a quarter of a million.

The Montana Central roadbed is now graded much closer to their mine than the Northern Pacific, and when the large tunnel, one mile above Wickes, is completed, the main line will run less than half a mile from the Minah mine, and thus will enhance their facilities for handling ore. R. G. H.

## The Newton Copper Mine.

EDITORS PRESS:—The Newton copper mine property is located four miles east of Ione, on the stage road to Jackson, Amador county, at an elevation of about 800 feet. The situation is all that could be desired both for convenience in working and beauty of location. While the earth is made to give up its treasure of copper from the rocks below, the surface of the mine yields its crop of fruit, grain and vegetables. As the surface takes in a ranch of 100 acres, the owners can be both ranchers and miners. By reason of its location the mine can be worked 365 days in the year. The mildness of the climate is proven by the fact that the mine ranch furnished the table with green peas at Christmas. While this does not excite comment on the part of a Californian, yet to the general mine operator it is a marked contrast to the usual condition of the climate in mining localities.

The Newton mine was discovered in 1860 by Mr. J. Newton, by whom it was operated in a small but successful way until 1867, when the mine came into the control of Glidden & Williams and Oakes and Oliver Ames of Boston, and was operated by C. T. Meader until 1868; then Mr. H. D. Ranlett took charge of the mine and operated it until 1876. The mine then passed into other hands until 1887, when the present owners, Mr. H. D. Ranlett and J. A. Ferson, became the possessors. From 1876 to 1887 the working of the ores was in the hands of a theorist. Under his management an extensive and expensive plant was erected in 1876, which proved one of the most marked successes as a failure ever recorded in California copper mining. The receipts of the nine years under this system showed from 1877 to 1885: Expense account, \$102,140 65; receipts \$50,906 45; theoretical gain of \$51,234 20, in Irish dividends.

The ore during this time carried an average of eight per cent in copper, of which about one per cent was extracted. The failure was due to the success of "Frierberger's" zeal as displayed in brickyards, elevators, roasting stalls, revolving barrels and every known or unknown contrivance for frequent handling and consequent expense in the treatment of the ore. By reason of faulty roasting, the ores were mostly converted into an oxide instead of a sulphate of copper, and were therefore not soluble for leaching purposes; hence the failure. From '85 to '87 the property was in the hands of a custodian. When Messrs. Ranlett & Ferson became owners, operations were conducted in the most simple and practical manner possible. Under their management the old works have been in part torn down and the balance allowed to remain for the present as a monument to theory.

At present the ore is run out of the mine in a car which dumps upon a pile of wood. When the pile has attained sufficient size the pit is covered over with earth and the wood underneath set on fire; a few holes on the top of the pit furnish sufficient draft. Once fired the ores continue to roast for eight months, when a spray of water is turned on to the pit, the leached solution flowing into sluice-boxes filled with scrap iron, where the sulphate of copper attacks the iron, destroys it and forms a precipitate of copper cement, which is then dried and sacked for shipment. For simplicity and inexpensiveness nothing more could be desired, two men by this method converting the soluble copper of 30 roasted tons into one of copper cement as against 10 men by the former processes with the attending expenses of foreman, engineers, firemen, and the enormous expense of constructing and maintaining an extensive plant.

That there is no evil unattended by good is exemplified here by the handsome returns and steady output realized by the present owners from releasing the old leach-pile of improperly roasted ore which day after day continues to give up its treasure of copper. The old dump of waste rock proves itself also a contributor of no mean proportion. By reason of the ores readily decomposing by the action of the elements alone and mechanically forming the sulphate of copper which is washed and leached out as are the roasted ores, I doubt if there is another copper property where nature alone will do the work, and that so effectually. In the readiness with which these mines' ores can be treated lies the great secret of their successful and profitable working, as the ore is naturally a leaching ore. No better exhibition of "something from nothing" was ever given, and that something a handsome return on the investment year after year from ore discarded by the former managers.

The mine is operated by one working shaft 400 feet in depth, from which four levels have been run 300 to 400 feet in length. The vein is four to eight feet in width. On the north side the ore of the first 100 feet remains untouched

and forms a handsome reserve. The chute expands from 200 feet on the surface to 400 feet on the 400-foot level, and grows richer in copper as depth is attained. The roasting ores carry an average of seven per cent in copper, while the shipping or smelting ores give 14 per cent on the average; frequent bodies yielding 20 per cent. The strike of the vein is northwest by southeast. There is scarcely any dip, the vein being almost vertical. The mine has been pronounced a true fissure by the well-known experts Mr. Howe, M. E., and Mr. Reese of Falkenau & Reese of San Francisco. For the present Messrs. Ranlett & Ferson will mine the ore from the reserves above the 100-foot level and work the ores in the old dump and leach-pile. They have a force of men at work taking out the ores from the old waste dump and placing the same in piles for roasting. They expect by midsummer to have on fire 4000 or 5000 tons of ore. Later on they will sink the main shaft an additional 100 to 200 feet and extract the smelting and shipping ores known to exist at that depth. Should the body of ore prove as extensive as everything now indicates, large smelting works will be erected for the treatment of all the ores on the mine.

The present owners have no desire to dispose of more than a minority interest. Should they do so, it would be with the object of securing sufficient working capital to put the mine at once in condition to work it to the fullest capacity. The old roasted dump-pile alone will yield 50 tons of copper without extracting one pound of ore from the mine. In view of location, character of ore, simplicity and inexpensiveness of treatment, nearness to railroad and the present boom in copper, Messrs. Ranlett & Ferson have every reason to shake hands with each other over their fortunate and now profitable investment. E. H. SCHAEFFLE.

## Ten-Mile District.

EDITORS PRESS:—This district lies 22 miles southwest of Helena, M. T., and is now connected by railroad with Helena by a branch of the N. P. R. R. One of the most prominent properties in this camp is the Peerless-Jennie, a silver and lead property. It is operated by an incorporated company and is superintended by Mr. Vaughan. The mine is shipping ore regularly, I believe, to the Holden smelter at Denver with satisfactory results. A force of miners is regularly at work taking out ore.

The Lee Mountain mine, also a silver and lead property, owned by Messrs. Caplier, Murphy and others, has been thoroughly tested, and when they can have their ore reduced at living rates will have no difficulty in realizing fair returns from their mine. The Red Mountain properties, lying adjacent to the town, are owned for the most part by the Montana Central railroad and will be inactive until they iron their branch. This it is expected they will do as soon as their reduction works at Great Falls are completed. Until this is done the town of Rimini will undoubtedly be dull, as there are not enough men employed to make it a lively camp. Quite a town was built here on expectations some two years ago; two fair-sized hotels and four or five stores were built and the usual number of other establishments. One trip daily is made on the road now and then, and a considerable amount of cordwood is shipped to Helena from along this road, thus creating a fair traffic for the railroad in connection with the supplies and ore shipments from the Peerless-Jennie. H.

## On Milling Ores.

The different methods of milling gold and silver ores come up occasionally for discussion, and indications of progress are always welcome. As the only object of milling these ores is the extraction of the precious metals imbedded in them, all devices for this purpose should aim at speedy reduction, economy of operation and a minimum loss of the precious metals. Strictly speaking, there are only four radically different methods by which this work can be done, namely, by rubbing the quartz to sand, as in the arrastra; by pounding it to sand, as in the stamp-mill; by crushing it, as in the rock-breakers and Cornish rollers, and by granulation, as in the rotary granulator. Some devices combine, in a measure, two or more of these processes. It is pertinent to inquire which of these methods, in the nature of things, must be the best. Manifestly that one, other things being equal, which is least destructive of the precious metals. As native gold is a soft metal and the quartz in which it lies imbedded is extremely hard, it necessarily follows that all rubbing, pounding and bruising of the soft, yielding gold against the hard, sharp quartz, must be rapidly destructive of the gold, the very thing to be avoided.

## The Stamp-Mill Method.

The loss of gold by attrition in the stamp-mill has for years received serious consideration, and a few pertinent facts will afford an intelligent understanding of this method. In gold-bearing quartz, yielding \$20 to the ton, for example, there will be an average of one cent's worth of gold in each pound of the rock, since there are 2000 pounds in a ton and 2000 cents in \$20, and in \$10 ore the average is, of course,



one-half as much gold in a pound of rock, or two pounds of rock to one cent's worth of gold. One cent's worth of gold is nearly the size of an ordinary pin-head, and the number of grains of sand of the size of a pin-head in a pound of ore is definitely determined by simple computation, and it is known to be a little over 98,000. In other words, there are nearly 100,000 grains of hard, sharp quartz to one of soft, yielding gold in one pound of rock worth \$20 a ton, and in \$10 rock nearly 200,000 grains of sand to one of gold.

#### Amount of Attrition.

The next step is to determine the amount of attrition, or how many times this pin-head of gold in \$10 rock is bruised, pounded, rubbed and ground with this mass of nearly 200,000 grains of sand before the whole is liberated. This problem is simple and easily solved. One stamp, weighing 750 pounds, and credited with crushing two tons in 24 hours, dropping 90 times, or striking the quartz 90 blows in a minute, in one hour will strike 5400 blows to crush one-twelfth of a ton, and in 12 hours will deliver 64,800 blows to reduce one ton. If the ore yields \$10 per ton, or 1000 cents, clearly it takes a fraction over 64 drops or blows of the stamp to liberate one cent's worth of gold, and it has been hammered, bruised, rubbed and ground 64 times against the sharp, hard quartz before it could make its escape. It is not surprising that about 20 per cent or one fifth of the gold is thus lost by attrition, and it is reasonable to suppose that this lost gold will be found as "elimes" in the water, and hence that the water from the battery will show it by assay. After all, then, it takes pretty good rock to yield \$10 a ton in this wasteful, wicked and wonderful stamp-mill.

#### The Granulator.

For convenience of illustration and simplicity of reasoning, the numerous devices, combining the rubbing and pounding processes, will be passed by, as they are alike guilty of attrition, and attention will be directed to the simple granulator as presenting a strictly diverse method from that of the orthodox stamp-mill. As comparatively few are familiar with the granulator and its mode of operation, a little information is desirable. The granulator consists of two vertical disks of iron, one being 18 inches in diameter with a concave face like a deep iron dish, and the other, 14 inches in diameter, with a convex face, somewhat like the bottom of a soup-dish, the peripheries being placed together on the lower right-hand side of the face of the larger disk, thus forming an opening on the upper side between the disks to receive the quartz the size of English walnuts, or even hen's eggs, the rock having previously passed through the rock-breaker. The disks are adjusted to do coarse or fine work by a set-screw, resting on a stiff steel spring, and a simple device provides for the passage of pick points or gads without injury to the mill. The faces of the disks, against which the quartz is broken, the only parts that wear, are made in the form of plates and bolted fast to the solid head or body of the disk, and these plates are readily removed and renewed. In a complete mill there are three sets of disks, arranged one in front and below the other as steps of stairs, so that the rock may pass for gradual reduction from one to the other by gravitation on a vibrating wire screen. The mill is run by belts and is a self feeder.

#### The Granulator Method.

The disks revolve together and in the same direction, the larger one going at the rate of 600 revolutions per minute, and the smaller one 700, thus producing a twisting and crumbling motion and pressure on the ore the moment it comes in contact with the faces of the rapidly whirling disks. The rock passes instantly through, crumbled and crushed into small fragments (one quarter of its fine enough), and the whole of it falls immediately upon a shaking wire screen, the fine going through the screen and on its way to the concentrator, while the coarser portion passes directly into the second set of disks, where it is again twisted, crumbled and granulated as before, only much finer, the disks being set closer together, one-half of it being now fine enough, and all falling again upon the screen, only the coarser part, usually about one-fourth of the original mass, is left for final treatment by the third set of disks, where it is granulated to sand, and in most ores it is little else than pure quartz sand, the precious metals and sulphurets having been already almost entirely eliminated.

#### Without Attrition.

A simple statement of the operation of the granulator reveals the patent fact that it is a method of reducing gold and silver ores without attrition of the precious metals, for the reason that, by this method, the ore breaks or yields at the point of least resistance, or where it is weakest, as where there is a seam or cavity containing gold or sulphurets, and in passing through the first set of disks, which reduces the ore to the size of coffee grains, nearly all the free gold and sulphurets are set free from the gangue and go through the screen without a bruise or mark on the gold, while the sulphurets may be broken between the thumb and fingers as they come from the concentrator. When ore is reduced to the size of coffee grains, in this manner, any practical miner knows that the small, solid pieces left contain comparatively little free gold and almost no sulphurets. On going through the second set of disks, the ore is reduced to the size of rice grains, and is found in the bands of the assayer little else

than pure silica. In a true granulator, there is, in fact, no grinding of the ore whatever, it being simply crumbled into sand.

There remain yet for consideration the questions, which method is the most expeditious? and which is the most economical? A full answer to these questions would exceed the limits of the present review, and is deferred to some other time. It is sufficient for the present to state that the granulator machinery weighs but one-tenth that of a stamp-mill of like capacity, is sold for one-eighth the cost of stamp-mills, and takes but half the power; a ten-ton mill costs but \$500, weighs but 1000 pounds, the heaviest piece 240 pounds, the plates or wearing parts only 80 pounds, costing five cents per pound, and will be renewed by the agent at ten cents a ton for every ton of quartz reduced by this method.

#### Granulated Ore Concentrators.

Concentrating granulated ores, that is, successfully handling both coarse and fine pulp at the same time by one machine, has been a hard problem in the milling of ores, but it has been finally solved by a perfect concentrator, made entirely of iron and steel, except a few small brass parts, the heaviest piece weighing but 102 pounds, the whole but 1000 pounds, and it should last a lifetime, as the only wearing parts are the scrapers, which are occasionally renewed at trifling cost. The basis of this concentrator is a vibrating iron table, 32 by 78 inches, inclined from head to foot, with the surface subdivided from end to end by thin iron ribs an inch high into narrow lanes four inches wide. These lanes have a series of depressions or basins in them 18 inches long and 1½ inches deep in the lowest place, with a rille at the lower end. The table is operated by a cam, the throw or motion being toward the upper end or head of the table. The force of the throw drives the pulp or granulated ore toward the head of the table, gravitation settling the heavier parts into the sand in the basins, and would send it all over but for the action of the water which is evenly distributed with the pulp at the upper end of each one of these narrow lanes, and flowing down, filling the basins in its progress, it passes away with the gangue over the foot of the table. It thus appears that we have three contending forces at work—the throw of the table, attraction of gravitation and the flow of the water, the force of the throw driving all the heavier parts of the pulp, such as sulphurets and free gold or silver, toward the head of the table, gravitation sinking them into the sand, each stroke or throw sending them forward and downward beneath the rolling sand which the flowing water is moving slowly on toward the foot of the table. The separation, which we see thus going on, is rendered complete by the action of the automatic scrapers which plunge down into the pulp at the lower end of the basins and travel along on the bottom of them beneath the mass of pulp, gathering the sulphurets and gold settled there, and, rising out at the upper end, they carry a portion of the sulphurets and gold over the rille of the basins above, where it is deposited, when the scrapers ride back again above the moving pulp and flowing water to the lower end of the basins and once more dive down to the bottom as before and move forward with their next load of sulphurets and gold. But the scrapers perform another essential service in keeping the pulp in a soft, loose condition by this constant plowing through it, so that the sulphurets and free gold will always sink into the soft bed to the bottom of the basins where they are caught by the scrapers and moved forward, the force of the throw finally carrying them over the head of the concentrator into a vat which stands ready to receive them. Amalgamation is the next step, and is a simple and easy operation. [The above article is from the *Resources of California*. The machines referred to are the Stiles granulator and concentrator.—EDS. PRESS.]

**SILVER LEAD ORES.**—Representative Woodhurn of Nevada says that one of the most important objections to the Mills tariff bill seems to have been overlooked, even by the opponents of that measure. It is proposed to reduce the duty on lead from \$20 to \$10 per ton. Woodhurn says if this reduction should go into effect it would mean the shutting down of scores of silver mines in Nevada, Colorado and Montana, Idaho, Arizona and Washington Territories. The value of lead in low-grade silver ores now pays, under a protective tariff, the cost of mining.

**MARIE A. VALENTINE** has filed a bill in equity in the United States Circuit Court, against Samuel D. Valentine, Thomas B. Valentine, George Horn, William Werry, Joseph Werry and Philip Nichols, to restrain them from working the Big Oak Tree mine in Placer county. The complainant alleges that she has brought a suit in ejectment against the respondents to determine the title and possession of the property, and prays that they be restrained from working the mine until the action has been decided.

**WAR BALLOONS FOR RUSSIA.**—The Russian Government has ordered a number of air balloons to be made in London, to serve in case of war. Each balloon is provided with a car in which six men can be placed. The balloons will be made of incombustible materials, and so disposed that they can be filled by means of hot air.

## The Mines and Miners.

BY PEDRO CASTERA.

(Continued from our last.)

[Translated for the Press from *El Minero Mexicano* by M. N. M.]

### The Immured Miners.

The darkness of the works was relieved only by a reddish light, which was struggling in an atmosphere charged with nauseating vapors of sweat, of blood, of pitch, of smoke and powder. The air was rent with cries of pain, of horrid imprecations, of blasphemies, of *ayes*, of complaints, but above all was heard the energetic and powerful voice of the mandon de barras, who exclaimed whenever a man fell wounded: *Adelante! Adelante!* (forward) *sin novedad!* (no danger.) I cannot describe the scene, but I know that it was horrible and at the same time magnificent. When I arrived and they heard the whistles and cries of command, they received me with a salute of applause, of hurrahs and of savage howlings. The work went on. "We want air!" cried several. "Some of you to the ventilators," I ordered. We were on the planes (lowest workings) of the mine, and notwithstanding the great velocity with which they worked the two fans, we were hardly able to breathe. "The water increases," screamed others. "Man the pumps," I said, and soon the water was diminished. In this incessant struggle, six hours without repose, they had extracted four dead bodies. The foreman said to me: "It is impossible to continue; there are already ten or twelve wounded, and"—I did not let him conclude. It was a critical moment, and if the men became demoralized all was lost. "Continue your work! Go on!" "Very well," he replied, "but we need timber to prevent the caving of the hill." "Let it be brought!" "It is all in use." "Use your men!" "¡Jesu Cristo! Men for props?" "For props! Yes, señor, but in action; *Adelante!*" The men, encouraged by these words, with shouts advanced to again contend with the rocks and stones that were crushing their brothers. Four hours later eleven of the unfortunates who were buried alive had been saved, and, weeping, were embracing the knees of the harreteros. The voices of the other five could be heard through the wall of stone that separated us from them, mournfully soliciting the services of a priest. This I can never forget. New efforts, new struggles, but without avail. The doomed men would die of hunger if not of asphyxia. One day and night more we labored, but it was all in vain.

### Un Padre!—Un Padre!

They murmured with feeble voices. The priest of the Real was sent for. He descended on the shoulders of a miner. Those following were exclaiming: *Un padre!—Un padre!* The priest, raising his voice, said: *Retire, my sons; you have done all that is possible; let religion do the rest.* That accent, mild, tender, modest, but at bottom energetic, dominated the situation. The placemen kept their arms, and the harreteros, who a few moments before appeared demons, began to file out sadly silent, occupying the next works. The priest and I remained alone in the gallery opposite an enormous heap of blood-stained rubbish that some torches were illuminating with a fantastic and flickering light. Standing there, grave, tranquil, erect, with authority, he fixed on me a serene look that was an interrogation. His beautiful brow was crowned with gray hair.

I drew near him and said in a low tone, "Padre, I do not think that I have fulfilled my duty. Destiny can be controlled, if one does not give way to it." "That is true; but here the death of these unfortunates does not designate a lack of foresight or exhaustive effort, it denotes the act of God," and the forefinger of the right hand of the priest was pointed upward. "No, not by Him—I have been vanquished by this wall of rock," I murmured. The priest laid his hand upon my head, which was burning.

### "Vanquished—Yes, and Pardoned;

Vanquished by Him who can defeat all; pardoned in His name by me. I forbid now any further labor." I withdrew then to the other works in which the harreteros knelt praying and prayed with them. The confessions of the imprisoned men were heard through the wall of stone. When they were concluded, the priest blessed and absolved them, and all the harreteros began their mournful alabado. The bells were tolling slowly, but by reason of the distance, we could hardly hear them. The harreteros would have suffered death rather than begin work again, after having been prohibited by the priest. I spoke to them, exhorting them, and even menacing them, but all was useless. The priest led me near the wall. "Señor amo," cried the unhappy men, "we have children." I could not speak. I did not shed a tear, but something furious and very black was in my soul. That honorable old man, that holy pastor of souls, whose name he forbade me to reveal, spoke to them, and promised to take under his protection their children. He complied with his promise, and to-day they occupy a place among the useful and laborious artisans of Mexico.

The words and groans of these victims of the unforeseen were depressing, and became more and more inarticulate. Some hours passed. The five men had perished. The priest drew me out of the mine almost by force about an hour before the sun rose. The sky was blue—

intensely blue and serene. Light cirrus imitated white swans wandering in the immensity. "The fountain of light" was sending forth torrents of fluid gold, which, breaking over the green and diamond-angled leaves, appeared like a rain of liquid rubies. Some hours later the intoxicated harreteros and their women were dancing beneath the burning rays of the mid-day sun.

The foregoing account I had from one of those heroes who lives in our memory by this simple episode.

### El Tildio.

The Real in which the event that I am going to relate took place is on a slope of the Sierra Madre, which passes through the State of —. At that point, the hills, which are the beginning of the Sierras, form a semi-circle that resembles an immense amphitheater constructed by giants. Between their two segments, the plains, covered with pasture, extend, until they are lost in the horizon, and in the evening look like a sea of sparkling fire, under the purple light of the sun. In the declivities, dales, angles, and little mesetas of the hills, mines are scattered in beautiful disorder, and on the plain are various haciendas (buildings, offices, smelteries, etc.).

One morning in the month of February, 1873, all the visible landscape was covered with snow, which had fallen during the night. Our country presents a great variety of climate. In the Real of the Espiritu Santo, of the State of Michoacan, the temperature rises to 35° Reanmur, and on the 14th, in the vicinity of Potosi, it fell to 7° and 8° below zero, with snow in abundance. The cold was intense, and the plains carpeted with snow were dazzling to the sight. Spirals of smoke from the smelters ascended, describing fantastic forms above the white of the llanura. Afar off the

### Plines of the Sierra.

Likewise draped with snow and standing out against the pale blue of the sky, seemed like immovable sentinels contemplating the vastness by which they were surrounded. The tiled roofs of the tiros, the divers offices and the great number of cottages of the miners were glistening in the whiteness, and little threads of water produced by the thaw, were running in all directions, distributing the light in a harmonious array of colors. It might be said that the clouds had cast upon the earth a shower of diamonds. The sun was shaking its golden head in space, slowly ascending and contemplating the landscape with an infinite look of love.

The women of the laborers, who were carrying to the latter their breakfast, were moving gracefully over the white ground of the snow, in their red, blue and yellow skirts; and the groups of harreteros crossing the hills, the mules descending the paths loaded with metal for the furnaces, the madereros dragging great beams and morillos, the carboneros carrying the alma for the forges, and the boys throwing snowballs, formed the life of that picture designed by nature with the essence of coloring and by the great Artist with the simple appearance of the sun.

The joyful sound of the chiro-bell calling to mass, the cries of the muleteers, the hammer strokes upon the anvils, the dull and distant detonations of the harrenos and the festive songs of those at work in a morning so luminous, placid and smiling, communicated to the spirit an unconscious faith, a sweet tranquillity and an infinite confidence in nature, clothed as it was in innocence, in whiteness and in light. The exquisite transparency of the atmosphere, the stir of the multiform life, the developing motion caused by the rising heat—all these splendors of the divine model, presented a landscape worthy to be copied by Vicenzo della Bruna or described in the artistic style of Gauthier.

(To be Continued.)

**SECOND GROWTH FORESTS.**—Among the problems which have remained unsolved to the present day is the growth of a second forest upon the site once occupied by a forest which usually differed in character from the later growth. It has been supposed that the seeds from which the second forest sprang had been lying undeveloped in the ground for a great length of time, perhaps centuries, but the improbability of their retaining their vitality for such a length of time, and under the conditions to which they must have been exposed, makes the theory rather implausible, and besides, the origin of the seeds is not accounted for. A practical woodsman of Indiana supposes that the seeds from which the second forest arises are carried in great numbers and from long distances by birds and the small animals which are found in the forests, and supports his view by relating observations of incidents in which it was actually carried out on a small scale.

THERE has been found in the mountains east of this city, says the *Tulare Times*, an extensive bed of chlorapatite, a mineral composed mainly of phosphate of lime. A piece of this mineral has been assayed and yielded 52 per cent of phosphoric acid. It may not prove profitable to extract this phosphoric acid, but the mineral itself is one of the best fertilizers known, and no doubt would prove valuable in reclaiming our alkali lands. No mineral substance possesses more influence over the growth of edible plants, such as wheat, oats, barley, turnips, etc., than phosphoric acid does, hence this discovery may in time prove a great boon to our farmers.





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SAN FRANCISCO

Saturday Morning, April 21, 1888.

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## Passing Events.

A mill is now at work on the tin ores of the Southern Black Hills, Dakota, and has recently shipped a lot of concentrates to be smelted. At present they can turn out two tons of concentrates per day, but expect to produce 100 tons a day. This looks like business at last, and no doubt if this venture is successful, other mines will be properly worked. We have never before had any American tin put in marketable shape, although small blocks have been made from California and Dakota mines.

The discovery of gold in Lower California still continues to cause some excitement in the southern part of the State, and a number of people have gone to the "find." It will be well, however, to take the stories with a "grain of salt." The country is a very dry one at best, and few people ever made any money gold-mining thereabouts.

The prospects for quartz-mining in California were never better than this season. Nearly all our well known mines are doing well and many new ones have been opened and are being developed. In the working of gold ores much has been learned in the past few years, and we can now mine and treat ores cheaper than ever before.

A railroad is to be built into the great copper camp of Bisbee, Arizona, to save cost of transportation in coke, crude hullion, etc.

Four Chinese hydraulicers were arrested on Monday, near Omega, Nevada county, and taken to jail at Marysville.

## Reflections on the Mining-Stock Market.

The downward course of mining stocks in view of the condition of the Comstock and other mines represented on the board is certainly very paradoxical. It is admitted that the leading mine on the Comstock are now in the most prosperous condition that they have been in for ten years. The California and Virginia has paid 16 dividends from the last discovery of ore, and all reports indicate that these dividends will be earned for an indefinite period. The Hale and Norcross promises dividends next month, and Potosi is prospering, as well as several other mines, which are practically off the assessment list. The outside mines, also, are in better condition than ever, North Belle Isle having disbursed in the past five months \$250,000 in dividends, with assurances of indefinite continuance. In fact, it would seem that dividends are sure, unless the managers act dishonestly, for speculative purposes.

Notwithstanding such situation, stocks continue to decline, and those surest of dividends, and those actually paying dividends, decline the most. Since December, every dividend paid by the California and Virginia has sent the stock down more than twice the amount of the dividend. What is the reason? Some say that the Committee of Reform appointed by the regular Stock Exchange to investigate the management of the mines has so disgruntled the inside managers that they have withdrawn their support of the market. There is little reason in this assertion. Any well-intended conference of stockholders in the minority with their managers, to ascertain whether the mines are managed economically and honestly, should meet cordial reception. All other corporations expect investigation, and are frank and open in their reports to stockholders. Mining corporations should be equally frank with their stockholders. While it must be confessed that mine managers do not seem to record stockholders' reports as do commercial corporations, there are other reasons for the vagaries of the stock market.

There can be little doubt that inside holders bear good dividend stocks to buy them in cheap, while doubtful or assessment stocks they sell because they wish to make the public carry them, and at a price that will not justify forfeiture for non-payment of assessments. This would seem to be the role that has been played for some time. Another disturbing element in the market is the conduct of unprincipled brokers. A customer gives an order for stocks and pays in his money on a margin. If the broker believes the market will decline he buys no stock and chances accounting for it on a lower market without a transaction on the Board. Or if he has purchased the stock, and he sees the market declining, while the customer holds back from selling, the broker sells the stock on his own account, helping on the downward tendency, and when called by the customer accounts for the stock at the ruling price without a sale. In this way he speculates on his customer's money, and at the same time helps to thwart his hopes of an advance. The November flurry brought out such practice.

The natural course of stocks, by reason of promising or unpromising developments, which the public would always be glad to gamble over, is so thwarted by such tricky manipulation that it is a wonder that anybody buys them. Whichever way an investment is made, insiders and brokers contrive to defeat the purpose of the investor. The course of the market is driven without regard to the reports from the mines. As far as affecting the market, all reports might as well be unpublished. Stop a dividend and the stock may bound up rather than drop down, as did California and Virginia, when it passed one dividend. Levy an assessment and the chances are that the stock will advance. In short, actual prosperity of the mine brings adversity to the stock-owner, and real adversity brings him prosperity.

In the former case the mine needs no help, and the stock may go to the insiders as cheaply as possible. In the latter case the mine cries for work, and the insiders make the public carry all the stock, if possible, and pay all the assessments till election time comes round and it becomes necessary to keep the management.

It behooves the insiders and brokers to consider well their ways, or they may "kill their goose."

## Better Go Slow on Copper.

The present is a good time for owners of copper-bearing deposits or of shares in copper-producing mines to dispose of the same, which implies, of course, that the present is a good time to refrain from investing in properties of this kind. Yet, trusting to a continuance of the high prices now ruling for that metal, there will be those who will make the mistake of purchasing these properties as there will also be those who will for the same reason make the mistake of refusing to sell them; these two classes of people, both the outs and the ins, disregarding the advice of the astute broker who counseled his clients to "buy 'em when they are low and sell 'em when they are high." That the price of copper will be kept up for several months is probable; but that the present abnormal rates can become permanent or even hold for any great length of time is out of the question. The foreign syndicate that now controls the market selected a good time for inaugurating their scheme. Toward the close of last year, when they had perfected their plans and were ready to commence operations, the price of copper was low and stocks in first hands much reduced. They were, therefore, able to negotiate the purchase of large lots of this metal on favorable terms, having at the same time a much depleted market to supply.

At the outset of their career other fortuitous circumstances and events contributed to work in their favor. The fire in the Calumet and Hecla mine, started a little while before, proved much more serious than was at first supposed, materially reducing production from that prolific source. Winter being at hand, no increment of plant could be made in the Michigan, Montana or other Northern mines, where more than half the world's output of copper is made. Even in California, Arizona and other Southern countries no largely increased production could at once be brought about. It required time to rehabilitate the mines and reduction works that through long disuse had fallen into a state of decadence, as many of the formerly producing properties in these countries had done, there having been in Arizona experienced the further difficulty of obtaining suitable fuel for smelting purposes on short notice.

From the start, and up to this time, everything has seemed to favor the aims of the great French syndicate. Until recently it has been found impossible to increase the output of copper to any great extent, and thus the monopoly has been able to maintain prices at nearly the highest figure reached since the advance began. But the question is, how much longer can this be done? In the attempt to answer this question we have first to consider the extent to which consumption will be reduced by reason of the high prices demanded for this metal, and which reduction an English authority put at one-third the quantity formerly consumed. Supposing this to be a fair estimate, we have here a potent factor working toward lower prices. That the output of copper, through the impetus lately given that industry, will very soon be increased in a like ratio there is reason to believe. The agencies tending to bring about a reduction of prices will be equal, therefore, to 66 per cent as compared with the former status of the trade.

In California the output of copper this year will be more than double the annual product made for many years past, while the rate of increase in Arizona and Montana will not be so large; it will hardly fall below 50 or 60 per cent on the yield of last year. Being universal in their effects these high prices will, in like manner, stimulate the industry throughout all the other copper-producing regions of the world. It has, in fact, done so already. What the result must be it is easy to foresee. That the price of this metal must in the early future undergo a marked decline seems inevitable.

Meantime, it will transpire that the more sagacious holders of shares in the big copper companies will have unloaded their holdings on the general public. Scores of worthless claims purporting to be mines will be put off on those confiding in a continuance of high prices and others anxious to profit by the copper boom, all hoping that, if not very lasting, it will last at least long enough to enable them to make a turn and get out before the crash ensues.

As years ago during the silver craze growing out of the Comstock discovery, so is there now danger that a like unhealthy excitement

will be bred of this copper furor, which, although it cannot prove so widely disastrous, will, if suffered to fully mature, result in a deal of mischief. The consequences likely to attend any unchecked development of the copper boom would perhaps find more apt illustration in the case of quicksilver, which, ten years ago, when the price of that metal had reached its acme, led to such activity in that branch of mining as soon caused the price of quicksilver to tumble below the point of profitable production, its sudden depreciation bringing heavy loss to those who had too hastily embarked in the business of mining for this metal.

As regards the proper policy to be observed in the case of copper, it seems to us that parties having pay bodies of ore already developed or deposits known to be rich, should at once proceed to work them to their fullest extent, making in the meantime as few costly improvements of a permanent kind as possible. Where the ore is rich enough to warrant shipment, the mine being without other than boasting plant, it would probably be best, in most cases, for the owner to sell to the smelters or to purchasers in the general market, and thus avoid the expense and delay incident to the equipment of their properties with reduction works. The idea we wish to inculcate being haste to avail of the present high prices and an avoidance of unnecessary expenditure in doing so. Experience teaches that such in all cases of this kind is the wisest course to pursue.

That an immediate decline in the price of copper will ensue or that the decline when it commences will be rapid is not very likely, there being little probability that this metal will soon touch as low figures as have obtained within the past two years. And yet the very reverse of all this may happen. It may turn out, as in the case of quicksilver, that such an over-production will come of the prevailing high prices as will precipitate them below the lowest point yet recorded. In the use of quicksilver there was nothing else that could be employed in its stead. Manufacturers having found substitutes for copper, it may happen that this metal will in some instances be permanently displaced, and thus its use come to be considerably curtailed.

When copper shall again fall to 10 cents per pound, should it ever do so, the owners of small mines and most small producers will have to retire from the field. It will then be possible for only companies having heavy bodies of at least fair-grade ores and making the metal on a large scale to continue the business with profit. Even some companies thus situated have within the past two or three years found it expedient to restrict production or close their works altogether. None of the Arizona companies, not even the largest and most prosperous, have, during the above period, run their smelters to their full capacities. These companies, influenced by the present high prices for copper, having only recently gone into full blast, and yet these parties have never disposed of the product of their mines for less than 10 cents per pound, the prices realized having generally been much more.

At 15 cents per pound, the American mines could supply nearly the whole world with copper. With the price reduced to 10 cents the output of these mines would be proportionately less.

ACADEMY OF SCIENCES.—At the meeting on Monday night Julius Koehig and Wm. T. Baggett were proposed as members. The death at Berlin of Baron Von Richtofen, the famous geologist, was announced. At the time of his death he was President of the Geological Society of Berlin. M. F. Gutzkow spoke of the deceased as a gentleman of many virtues and a profound student, highly respected by all who knew him. Dr. Harkness spoke briefly of the pine-tree fungus, a growth discovered by him some years since near Colfax, in this State. Dr. George Hewston read a short paper on the lamprey. It was reported that 131 volumes and pamphlets had been received in the library.

TIN.—A Chicago company is now running the only tinmill in the country, on the tin ore from mines in the Southern Black Hills of Dakota. It is said there are fully 100 tin mines within 15 miles of Custer sufficiently developed to warrant putting up mills. Tin concentrates were recently sent to Chicago to be smelted, and the result will be the first American tin ever put on the market.



## Cases for Entomological Specimens.

Mr. Chas. F. McGlashan of Truckee possesses probably the best entomological collection on the Pacific Coast, and certainly the best arranged one. The collection is especially rich in butterflies, as he has spent many years in gathering the different genera and species. Aside from his own collection, Mr. McGlashan supplies those found on this coast to Eastern and European collectors. His system of preserving and exhibiting specimens is novel and very effective. The specimens are so arranged that the lower as well as upper side may be observed and studied, and the method of mounting is such as to prevent the attack of any parasitical insects.

Mr. McGlashan has recently patented, through the MINING AND SCIENTIFIC PRESS Patent Agency, his peculiar system of preserving and exhibiting entomological specimens. The case is made wholly of glass, preferably in the form of a six-sided box. It is made in sections, each side being a separate piece—that is to say, the top is one piece of glass, its bottom another piece of glass, and each of its sides one piece of glass. The meeting edges of each piece are beveled or chamfered to an angle to suit the particular case, and these joints are thoroughly cemented together, so that the sections of the case become practically a single piece, forming a hollow shell or casing which is permanently and hermetically sealed.

Before finally sealing the sections of the case the specimen is placed in position in the following manner: To the inner surface of the bottom section is firmly cemented a small piece or standard of soft wood or cork, and on top of this a small sheet of absorbent material, such as unsized or blotting paper. The impaling pin is then passed through the body of the specimen and through the blotting paper, its point being inserted into the cork, so that the specimen is thus supported in approximately the horizontal central plane of the case and may be observed from all sides.

The piece of cork or soft wood which serves as a standard differs from ordinary things of the kind, in that, before being placed in position, it is treated with a suitable insecticide—such as orosote, carholie acid, cyanide of potassium, chloroform, etc.; and the piece of absorbent paper is treated in the same way. The pieces of paper, in addition to its object of giving forth a vapor destructive to parasites upon the specimen, serves also to steady the impaling pin in the cork standard, and further, the medicated cork and piece of paper will prevent the injurious attacks of those parasites that may drop from the specimen upon the bottom of the case.

The main feature of the invention is the mode of preserving the specimens, which consists in mounting them within an all-glass case permanently and hermetically sealed. Each specimen is excluded from the air for good. No harm can come to them, as would be the case if doors were provided to afford access as in an ordinary show-case or where the joints are made simply with paper pasted over them, for in both instances the air, dust and dampness find access to the interior and soon spoil the specimen.

The specimen may be inspected from all sides and above and below. The construction of the case is of the simplest character, requiring no ledges, dovetails, grooves or clamps to hold the sections together, but simply requiring the edges to be mitered or beveled to other suitable angles and all held together as one piece by means of a proper cement. Hermetically sealing the case prevents destroying insects from getting in. The label or description of the specimen, its history, and any matter of interest connected therewith, may be firmly cemented to the inner surface of the glass.

The Bald Mountain Extension Co., a Sierra county drift mine, has, during the past two months declared two dividends, Nos. 16 and 17, aggregating each \$3000. Everything is prosperous at the mine, and 70 men are kept at work. Some friends of the PRESS are interested in this rich mine, and we are pleased at their good fortune.

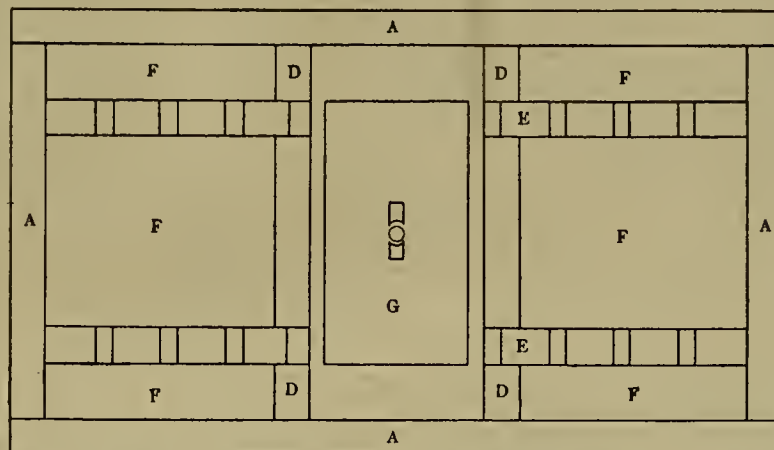
SPECIAL circulars of air compressors for elevating acids, working pneumatic riveters and sinking caissons for piers of bridges, also of vacuum pumps for ssaling incandescent electric lamps, have been issued and can be had by addressing the Clayton Air Compressor Works, 43 Dey street, New York.

## Mexican Mines.

We had a conversation this week with a gentleman who has just returned from Sonora, Mexico, and who, while he thinks the mining region a very rich one, does not think it a favorable place for Americans to invest. He says the moment the officials find a mine is paying they also discover new means of taxing its owner. Labor is cheap but provisions are high. In Sonora there are 18 or 20 American reduction works, but only four or five are running. There are many prospectors and miners, but they seem to have a hard time of it. It is difficult to get any very good food, and even

themselves. In this way mines can be bought cheaply enough, for everybody seems to have them. Reduction works are few, and what there are belong to private companies who only work their own ores.

THE DIVIDEND PLACER MINING Co., recently incorporated, is to open mines in Kelley Creek district, White Oak township, El Dorado county. We have seen the prospectus which states that the company has purchased and bonded the Pelton placer claims and others, making a total of 393 acres, of which 150 acres is considered first-class mining land. Various owners held this land, but the lower claims con-

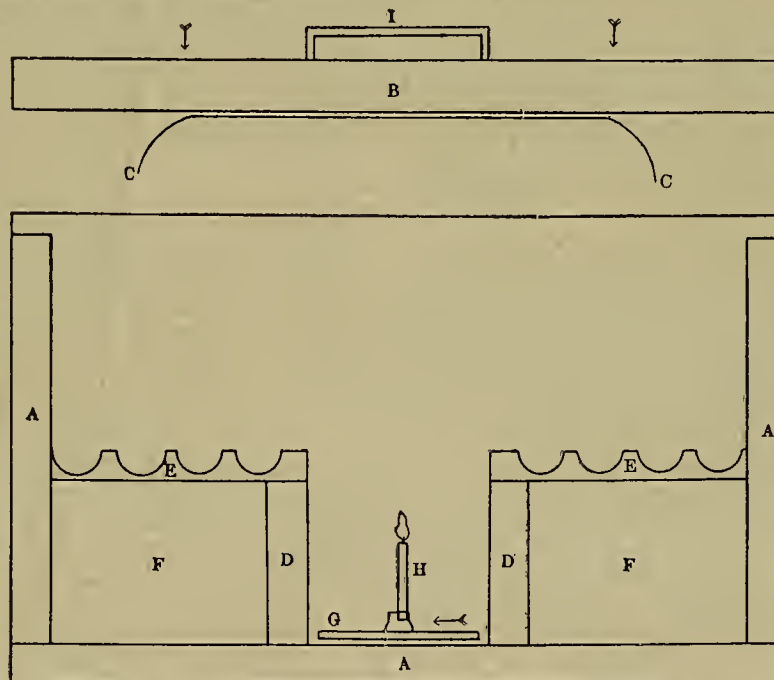


PLAN VIEW OF INTERIOR OF BOX FOR THAWING GIANT POWDER.

rich people were satisfied with tortillas and beans. There is little show for small capitalists, and freighting and teaming is very expensive. Water is usually to be had from springs on the mountain-sides, but bodies of water for large mills are rare.

The ledges in the mountains usually take a southeasterly course. Sometimes in this foot-

controlled the water so that little work was done by the others. There has, however, been work enough to have yielded about a quarter of a million of dollars in gold dust, with only about a third of the property mined, and that not thoroughly. The company thinks it will take out several hundred thousand dollars' worth from the claims it owns. The prop-



SECTIONAL VIEW OF BOX FOR THAWING GIANT POWDER.

hills, or on the dead level, very rich pockets are found which are easily worked. The classes of ore in the mines vary greatly. Some is free-milling, some smelting, and some require roasting; this occurs in mines very close together.

Our informant saw a mine only three miles from the railroad which has some old shafts and tunnels upon it, and on the dump about 10,000 tons of refuse ore which was thrown away by the miners of a hundred years ago, when the picked ore was worked in arrastras. Assays of this refuse rock went \$84 silver, \$20 gold, \$60 silver, \$15 gold, and \$58 silver and \$30 gold.

There was plenty of wood, and water could be procured about two miles distant. Within a belt of a mile there were three mines of this character. Everybody has mines for sale, but the only way to get hold of good ones is to go there and stay a few months and see the mines

erty is to be worked systematically and a reservoir is to be made of sufficient capacity to insure a supply of free water for the entire year; ditches are to be built and pipe purchased, for which purpose 2000 shares of the stock are to be sold. The management expects to complete all preparations and commence working by December of this year. A. J. Hare, 173 Railroad avenue, South San Francisco, is secretary and D. C. W. Hodgkin president and treasurer of the company.

THE Sacramento Bee says: Ground has already been cleared for extensive additions to the Southern Pacific Company's shops in this city. The shops will be increased about one-third, which means the employment of at least 1000 more men.

On the 17th inst. Isaac Thatcher, a miner, was injured, though not fatally, by boxes falling on him in the Bald mountain extension dump.

## Thawing Out Giant Powder.

A good many accidents happen in the mining regions every winter from thawing out frozen powder. There are proper means for doing this, but they are not always taken advantage of. Mr. Wm. O'Keefe of Helena, Montana, sends us sketches of a box intended for thawing powder, which can be made by any one. It will thaw out the powder in 20 minutes, and keep it in condition for three or four hours after the candle has gone out. The box may be nailed up to the wall near the work and needs no watching, as the candle cannot be blown out. It is made out of a candle-box, and three short pieces of candle will work it 24 hours.

One side of this candle-box forms the top. The box *A* is 17 inches long, 9 inches wide and 10 inches deep, with sides extending half an inch above the ends. It is covered with paper on sides, bottom and top, and then half-inch board sheathing put over that. *B* is the top or lid of the box to lift off. Around the outer edge and on top of the lid is tacked a strip of old gum hoot-top with the lining side down to keep the joint close. The lid should have an eight-inch play so it will come off easily, and the rubber extends over and covers up the open joint.

*C* is a piece of tin 6x13 inches, nailed to the bottom of the lid to reflect the heat downward to the powder. *D* is a piece of board 3½ inches high to form a bin at each end of the box. *E* is a rack on top of the board *D* on which to rest the powder. *F* is a bin filled with oatmeal or huckwheat. It is partly covered by the rack *E*. This will retain the heat a long time, and if the powder should "melt" the drops cannot explode by concussion. Charcoal dust should not be used.

*G* is a piece of board covered with tin, and there are two pieces of hoop iron nailed upon it to grip the candle. They do not extend entirely around the candle, so the grease will drop down and cool. This is lifted in and out. *H* represents the candle, four inches long, and *I* is the handle to the lid.

Mr. O'Keefe devised this box last winter and has used two of them while he has been running some tunnel work. The boxes work to perfection, he says. The powder was not easily thawed on the bodies of the men in that cold climate, and the time lost, and danger with a stove, is well known. In this box the sticks are thawed to the center, and one may go at any time and find the powder ready.

A three-eighths hole should be put on the side near the bottom of the candle, and two should be made in the lid. If the candle will not burn, more holes may be made in the lid. Care should be taken not to make too many holes, however, as this will result in cooling the inside of the box. As Mr. O'Keefe says, carrying powder makes some men sick, and when put in a boot it is only half-thawed. Hot water cannot always be procured, but this box furnishes a good and safe means of thawing powder.

It is proposed now to carry into effect the original proposition of making a large canal bringing water from the American river to the town of Folsom. It is to be six feet deep, 32 feet wide and with a fall of nearly a hundred feet. This will give employment to prisoners and give power for manufacturing purposes, and make Folsom a manufacturing town with unlimited water-power. The canal will also furnish water to irrigate a large tract of land.

VICE-PRESIDENT OAKES of the Northern Pacific says the sale of 80,000 acres of timber land in Washington Territory, within 30 miles of Tacoma, has been consummated. The transaction involves the construction of a line from Tacoma, to be known as the Tacoma Southern, to cost \$2,000,000.

THE four Assistant Commissioners to the Melbourne Exposition will be F. B. Wheeler of New York, L. R. Miller of Lynchburg, Va., Mr. Stevens of Boston, and Mr. Kemble of New Orleans. The Chief Commissioner is Frank McCoppin of San Francisco.

THE Hawaiian sugar crop this year will amount to over 100,000 tons, of which about 60,000 tons come to the American and the balance to the San Francisco refinery.

THE Santa Rosa & Carquinez railroad is rapidly nearing completion.



## MECHANICAL PROGRESS.

## Important Investigation in Regard to Manganese Steel.

Two very important papers were presented at the late meeting in London of the Institute of Civil Engineers, by Mr. R. A. Hadfield, giving the result of his important researches into the promising field of steel manufacture. The papers were entitled "Manganese in its Application to Metallurgy," and "Some Novel Properties of Iron and Manganese."

## Manganese Steel for Castings.

Mr. Hadfield said that his company, some time ago, was in search of a material suitable for making castings which should possess hardness and toughness, as ordinary steel castings did not combine those qualities. The question of manganese was one of the subjects most particularly treated. The result of experiments showed that, while the belief hitherto held that steel became brittle and comparatively worthless when the manganese exceeded 2.75, was correct, when more of the same metal was added, so as to obtain in the material under treatment not less than seven per cent of manganese, the result was a new metal.

The apparent paradox thus took place, that while manganese alloyed with iron, if present in the proportion of not less than 2.75 and up to 7 per cent, gave a very brittle product, when its proportion was increased to not less than 7 and up to about 20 per cent, the result was a material possessing peculiar and extraordinary strength and toughness.

## Experiments With Cast Bars Containing Manganese.

The brittleness of the cast material seemed to partake more of the nature of glass, or other similar substance, than of steel. Cast bars, about 2½ inches square in cross section, 30 inches long, were supported upon bearings 2 feet apart, and broken under hydraulic pressure, the breaking load being carefully noticed in each case. One of these specimens, containing 0.37 per cent carbon and 4.45 per cent manganese, was fractured under a pressure of 3½ tons; while a bar of ordinary cast iron stood 12 tons, and the higher percentages of manganese, 17 and 20 per cent respectively, stood 29½ and 38 tons.

## Further Valuable Experiments.

Another instance was afforded by a bar casting containing 4.73 per cent manganese being dropped from a height of three to four feet on a floor paved with cast iron, when fracture occurred in two or three parts of the bar at the same time, showing its extraordinary fragility. Pieces from another specimen, containing 0.48 per cent carbon and 4.9 per cent manganese, though exceedingly ductile when hot, in the cast state, when cold, could be reduced by a hand-hammer to a fine powder, no cohesion seeming to exist between the particles.

## The Experiments Continued.

On the other hand, a specimen of forged material, containing 13.75 per cent manganese, and 0.85 per cent carbon, when water-toughened, had a tensile strength of 65 tons per square inch, with 50.7 per cent elongation; and another specimen, 69 tons and 4.6 per cent respectively. In the latter case the tensile load, calculated on the area of the bar at the moment of the fracture, was equal to 102 tons per square inch. Tools made from this material, said Mr. Hadfield, had afforded some remarkable results.

## The Qualities of Manganese.

The experiments of Mr. Hadfield have now led the firm to the conclusion that manganese possesses in a most remarkable degree toughness to resist severe usage, and hardness to prevent permanent set without bending or buckling.

## How to Prove Manganese in Steel.

An approximate idea of the amount of manganese contained in steel, said Mr. Hadfield, might be formed by passing a magnet over specimens; as the percentage of manganese increased, the effects of the magnet diminished. Upon reaching about eight per cent, there was no attraction in the bulk, though five drillings were influenced; but when 20 per cent was reached, a magnet capable of lifting 30 pounds of ordinary steel or iron would only lift pieces weighing a few milligrams.

We collate the above from the English correspondence of the *American Manufacturer*.

AMERICA'S IRON AND STEEL PROGRESS OF SERIOUS IMPORT TO ENGLAND.—Sir Bernard Samuelson, a gentleman of large experience as an English steel-master, is warning his countrymen against the danger which threatens England on account of the rapid advance which this country is making in its iron and steel progress. He warns his countrymen to prepare for the increasingly serious competition from nations who are already competing with England. He says: "Of the increase of 760,000 tons in our equipments of iron and steel last year, compared with those of 1886, about 400,000 tons were due to increased demands from the United States. The enormous increase and production of iron and steel in the United States did not," said Sir Bernard, "at present affect our trade in neutral markets. Still it was worth while to mention that whereas, in 1881 the production of pig iron in the United States was only one-third that of the United Kingdom, it has been increased from year to year, till last

year it amounted to more than seven-eighths of England's own production." Some of the English iron-masters are flattering themselves that they will be greatly benefited by our proposed tariff revision; but Sir Bernard tells them that such revision, if it is realized, will not be without its drawbacks.

## Casting Great Guns.

The big gun recently cast at the works of the Pittsburgh Steel Casting Company, at Pittsburgh, has been taken from the annealing furnace and found to be in excellent condition. It was put into the furnace on February 24th, and gradually heated up to 1400° F. Then it was slowly cooled and hardened, again raised to 1400°, and after being allowed to remain at that temperature for a time, finally withdrawn from the furnace after having remained there two weeks, the heat being kept up by means of natural gas. Superintendent Hainsworth has expressed himself as being perfectly satisfied with the results so far, and expects to have the gun ready to ship by the 20th inst. The final test will take place at Annapolis, and if it proves successful Mr. Hainsworth is ready to begin the casting of a gun 111 tons, as large as any ever cast.

The diameter of the gun's bore is to be increased one-half inch. On trial it will be placed by the side of one of the "built-up" guns and fired by alternate shots. If the trial should prove a success, of which the builder, Mr. Hainsworth, has no doubt, it will work quite a revolution in the manufacture of great guns.

England's largest built-up gun weighs 111 tons and cost \$225,000. It is made of 43 separate pieces, is 43 feet long, and will throw a projectile 13 miles, which is five miles farther than any American gun. If this gun is a success Mr. Hainsworth will offer to make one of equal size and performance with the great English gun, with a guarantee of better quality, and at a cost of only \$175,000, a saving of \$50,000 over the cost of the English make. Thirty years ago the largest gun made was only ten feet eight inches in length, and weighed but five tons.

The discovery of Lieut. Graydon, that dynamite shells can be safely fired from common ordnance, as at present constructed, is another important step in this direction. The havoc-working power of shells so charged and projected is almost irresistible, and is considered quite sufficient to destroy the most powerful ironclad, with a few well-aimed discharges.

WIRE-DRAWING.—At one of the meetings of the German Society of Engineers of the Lenne district, Herr Baedeker delivered an address embodying the results of a series of experiments to test the accuracy of the opinion held by wire-drawers that wrought iron is least affected by excessive pickling, mild steel a little more and hard steel considerably more. At the same time he undertook to investigate the question whether sulphuric acid and hydrochloric acid acted in a different way—that is to say, whether either of these acids pickle more readily than the other. The test was carried out by using as a basis for comparison the number of bendings which a wire would resist without breaking after the different treatment it had received. The result was that wrought iron and mild steel are attacked about the same way, while hard steel suffers more, and that there is very little difference between the action of sulphuric and hydrochloric acid, the drawback with the latter being that the fumes are more troublesome to the workers. It was ascertained that a short period of pickling suffices to considerably affect the ductility of hard steel. It is a well-known fact that wire over-pickled becomes fit for use again when allowed to lie in a dry spot for a considerable length of time, and that annealing may be used to remove the objectionable influences of pickling. Both these methods are not, of course, applicable in ordinary practice, and, therefore, another method was studied. Mr. Baedeker found that moderate warming for a fair length of time brings back the quality of the wire to its ordinary standard, and, as most wire is dipped into milk of lime and is then dried, the heating required can easily be carried out in drying ovens.

REMARKABLE MARINE ENGINES.—The enormous size that modern marine engines have reached can hardly be believed by those who have not watched the growth of them during the last few years. The City of Rome's engines have six cylinders, three of which are over seven feet in diameter; and they indicate 11,890-horse power. The Etruria and Umbria each have three cylinders, two of which are nine feet in diameter and the remaining one six. Thanks to these monsters, the Atlantic ocean has become a great ferryway, and the voyage that once required over a month has been made in six days and a quarter. None of the celebrated Atlantic mail steamers have triple expansion engines, but two large vessels that are now building are to have triple engines with forced draft. They are to develop 18,000 horse power and are expected to eclipse all of the others in point of speed. Two vessels of the present navy of Italy develop 18,000 horse power, and two others, now building, are to develop 19,500. But the most wonderful marine engine yet designed are those of the Sardegna, which are to comprise 12 main cylinders, arranged triple expansively, and are to develop 22,800 horse power. This vessel, in all, is to contain 62 engines, comprising 90 cylinders.

## SCIENTIFIC PROGRESS.

## Ancient Microscopes.

Mr. Frank Crisp, vice-president and treasurer of the Linnean Society, and secretary of the Royal Microscopical Society, gave a lecture at the Royal Institution on Feb. 3d on "Ancient Microscopes." In the library, on specially placed stages in the theater, and on the lecture table, were some 600 microscopes of early dates, while on the tables of the library were shown many early books containing figures of microscopes.

Among the works were those of Robert Hook, 1665, Adams, with a plate of a solar microscope, Pierre Lyonet, with a plate of a dissecting microscope, and a practical work by Adams, a maker, dated 1747. The first reference made by Mr. Crisp in his lecture was to one of the latest productions of Powell and Leland as a type of our present perfection. Turning from this to the odd shapes of the early works, Mr. Crisp said he meant in his title by the word "ancient" any microscope made earlier than 100 years ago. We now look for clearness of vision, stability and absence of all needless adornment. It is interesting to see from what our present work has been evolved. One striking point is that though we now make only of brass, the "ancients" made of wood, ivory, tortoise-shell and papier mache. But they also excessively ornamented their microscopes.

To illustrate this there was held up an elaborate stand for a really weak microscope made for Cardinal Lambart, afterward Pope Benedict XIV, where the silk linings and the large space for the papal insignia made the whole affair ludicrous in the eyes of a man of science. After others belonging to popes and distinguished people had been shown, a strange green-colored one for George III was held up. But, it was remarked, no good recorded work had come from any of these. They were like toys. In tracing stability for a microscope it was shown how long it took to acquire this. Some were placed on the table which a puff of breath blew over. At length there seemed to be acquired stability to such an excess that adjustment was difficult.

It appeared to us now strange that it took so long for the right use of a mirror to be understood. The old way of getting a focus was really barbarous. Some drawings of old microscopes were shown on the screen, odd pictures with tubes five feet long, and men standing on hillocks to use them. The explanation was that where an eye was at first used to indicate the point of observation, subsequent draughtsmen put in the entire human figure, and so lengthened tubes for artistic effect. On the whole, however, we have to be thankful for what the ancients did, as from their work has come our modern powerful instrument.

IMPROVEMENT OF LAND BY NITRATE.—M. Barthelot has sent to the "Academie des Sciences" an exceedingly interesting note upon his work in reference to the general conditions under which azote (nitrate) undergoes fixation in vegetable land. He has found from his long experiments that certain clayey soils and certain sands have the property of fixing atmospheric nitrate, and of enriching themselves slowly and progressively in organic nitrate matter, consisting of organisms or derived from them. Land should not be considered as a mineral substance, inert and invariable in its composition, but as matter filled with living organisms, of which the chemical composition, and especially the richness in niter, vary and change according to the presiding conditions of the vitality of these beings; in fact, these organic compounds appear to belong to the tissues of certain microbes contained in the soil. In order that these phenomena may occur, the soil should be porous, that is, accessible to the circulation of air, able to receive a small measure of water, and be of a temperature varying between 15 and 50 degrees. The phenomenon of the enrichment of the soil in nitrate matter would therefore differ according to the seasons. Again, it would be limited in the case where no vegetation, properly so-called, were developed in the ground, in which case the possibility of its being produced on the part of these beings or substances contained in the land appears to cease after a certain time. For practical agriculture there is as yet no definite conclusion to be drawn from these splendid works, but it must be recollected that the problem is quite distinct from that of nitrification in arable land, as otherwise great confusion would arise from erroneous conclusions.

PURIFICATION OF WATER BY ELECTRICITY is the latest electric discovery. This is said to have been accomplished by two Pittsburgh gentlemen, Prof. Black and R. W. Smith. A patent has been applied for and details are for obvious reasons suppressed; but it is claimed that very remarkable results have been achieved, and that the destruction of all animal and vegetable life, and the entire removal of everything deleterious to health, can be successfully accomplished, resulting in the production of water absolutely pure. It remains to be seen, says the *Western Electrician*, whether this can be accomplished on a sufficiently economical basis for general use. If so, it will be a great boon, as impure water is a fruitful cause of disease, and there is probably very little water in use which is even

approximately pure. In the rural districts the water obtained from wells and springs is largely impregnated with mineral impurities, and surface water is filtered through strata of rock and soil, while the unfiltered surface water obtained from brooks and ponds is still more impure. In large cities the sewage is, in many cases, a constant menace to the purity of the water, and wells in the vicinity of cemeteries, barnyards and privy vaults are poisoned fountains.

## What a Blizzard Is.

A person ought to have gained a clear idea of what a blizzard is after reading this extract from the *Toronto Globe*:

A blizzard is simply a strong, cold wind moving unchecked over leagues of light, unpacked snow. It sweeps up that which has previously fallen, carries it away in the color of a vast shaken fleece, distributes it so that each atmospheric atom has its little particle, and drives along all with a steady fury. Whether fresh snow is falling can seldom be determined by people out in a real blizzard. As far as the eye can see upward, and that is but a little space, the hurry of minute pellets hurling through ether across an unrevealed sky prevails, and the hurrying sameness on every side is varied only by occasional tall and hending wreaths where the wind whirls in shifting column. A confusion of the senses, comparable to none produced otherwise, spalls one submitted to the enormous and blinding force of such a snow-filled wind, and scarcely a distinct thought remains except that the awful cold forbids crouching for rest and shelter. To our personal knowledge one in such a storm keeps with difficulty upon a railway track lifted three feet above the surrounding prairie, and may be lost by five steps the wrong way after stumbling down from the embankment, which, being white, becomes instantly invisible. It is recorded on good authority that teamsters halting with their horses have been snowed over 30 feet deep by blizzards, and have survived by heating out breathing chambers till the cessation of the storm enabled them to dig themselves to upper air. The formation of a drift about a halted man, or horse, or sleigh, is sometimes wonderfully speedy, and the drift, once established, grows by virtue of its obstructiveness. In some well-authenticated cases lost persons have been found by the drifts over them and dug out alive, in others the spring has revealed corpses still unthawed among the last white relics of winter. In blizzards people have often been unable to see across the street of a northwestern town, and sometimes men lose their direction in trying to reach the opposite side of a well-built way.

THE MULTITUDE OF THE STARS.—In some remarkable mathematical observations by M. Hermite concerning the number of stars, he shows that the total number visible to the naked eye of an observer of average visual power does not exceed 6000, and of these the southern hemisphere contains somewhat the larger number. In order to see this number of stars the night must be moonless, the sky cloudless, and the atmosphere pure, and here the power of the unaided eye stops. An opera-glass will bring out 20,000, while a small telescope will bring out at least 150,000, and the most powerful telescopes yet constructed will show more than 100,000,000. Of stars of the first magnitude or greater apparent brightness there are 20, and, in passing from one order of magnitude to the succeeding, it is found that the number of stars follow the law of an increasing geometrical progression, of which the first term is 19, and the ratio three, there being, therefore, 57 stars of the second magnitude, 171 of the third magnitude, and so on, the number having thus increased to over 30,000,000 when the 14th magnitude is reached. M. Hermite concludes from his various observations that the light emitted by all the stars upon the whole surface of the globe is equal to one-tenth of the light of the full moon.

ELECTRIC RESISTANCE OF COBALT.—Dr. G. Fae of the Royal University of Padua has made a series of experiments on the variations of electrical resistance in cobalt and antimony in a magnetic field. These show that when antimony is brought into a magnetic field there is an increase of electrical resistance both along and across the lines of the magnetic force of the field. The increase across the lines appears, however, to be the greater of the two. In the case of cobalt a diminution of resistance was found across the lines of force, and an increase of the same along the lines of force. Antimony, therefore, behaves like bismuth, and cobalt like iron and nickel.

BLACK GOLD—A NATURAL ALLOY OF GOLD AND BISMUTH.—Mr. R. W. E. MacIvor has recently analyzed a specimen of black gold obtained at Maldon (Victoria) found in the granite veins which are met with in the quartz of that country. When fresh broken, the ore is crystalline, malleable, and of a silvery appearance, but on being exposed to the air, it becomes dull and blackens. Running through a sieve eliminates the bismuth and leaves the pure gold. Mr. MacIvor's analysis gives its composition as follows: Gold, 64.211 per cent; bismuth, 34.398 per cent; silicate matter, 1.591 per cent. The black gold is therefore in reality a natural alloy of gold and bismuth.



## GOOD HEALTH.

## The Human Stomach.

Dr. C. N. Ellenwood of this city, in a recent lecture before the Cooper Medical college, gave the following description of that wonderful organ—the stomach: The doctor described the average healthy stomach as a muscular sac, lined with a mucous surface, the whole resembling the winding of a Scottish bagpipe. It is from 13 to 15 inches long, and its walls are of the thickness of about three sheets of blotting paper. In a transverse direction it is about five inches and its normal capacity is about five pints. Experience or education has incurred in the stomach the habit of distension, an important function of which the old nomads have availed themselves. But in our present dissipated condition, when these meals are taken daily and easily obtained, there is no need for such an education of the stomach, and five pints is even sufficient capacity for any Thanksgiving dinner.

The wonderful activity of the stomach in the assimilation of food, the revolving of the latter in from about one to three minutes in order to be completely churned up to facilitate digestion, the expulsion of the soft particles of food into the intestines, the retention of the hard substances followed by their expulsion, if not of too great caliber, were in turn described.

The muscular fibers producing the churning process and the propulsive power in ejecting the juices to precipitate digestion, were treated of in turn.

Considerable attention was also devoted to the wonderful structure of the mucous membrane, the depressions in whose surface resemble vacuoles, being open mouths, 1,400 of an inch in diameter. They are thickly placed, and are in close relation with the blood-vessels, supplying the material by which the gastric juice is elaborated. How these glands form the juice, the speaker said, was extremely difficult to explain, but he made the comparison to the growing and nutrition drawing roots of plants, the blood in the glands furnishing the nutritive material.

During the intervals of digestion the stomach is inactive, and the membrane is covered with a translucent, viscid, alkali fluid, furnished by the goblet cells. Fright from a sudden shock arrests at times for hours the process of digestion; so does any depression of the system. Fear, rage, excitement, stimulants, or the overloading of the stomach have the same effect, all of which teaches that we must, when sitting down to the table, be free from the depressing influences of the mind over business or other matters, and appreciate the danger of depressed physical or mental conditions of every kind. Busy people who are the ones to abuse their stomachs most by quick eating and by having their minds weighted with the cares and troubles of business, are the first to complain.

The daily secretion of gastric juice in the stomach is 14 ounces, which is passed off with the assimilated food, and the secretion is proportionate to the amount of food taken, but less when eating is observed too frequently, while overloading likewise delays digestion.

The process of the transformation of foods in the stomach and their dissolution into component parts to be absorbed and serve the purpose of nutrition to the body, were elaborated upon, but the lecturer freely admitted that these chemical and physical changes were not yet thoroughly understood. The speaker inveighed against the use of condiments, highly seasoned articles of food, and the pleasures of the table generally, asserting that the consumption of plain, simple and wholesome viands, intelligently cooked and gracefully served, are by far more conducive to good health and sound intellect, between which and the stomach there is a close relation.

The speaker also ridiculed the saying that to eat well is to leave the table with the feeling that one could eat more. His advice was to eat enough to satisfy the appetite, but not leave the table either hungry or feeling stout, heavy, or uneasy.

**POISON FROM HUMAN TEETH.**—The poison conveyed by the human teeth is one of the most annoying that a physician ever has to deal with, writes Dr. A. C. Robinson. "A bitten ear or nose is months in healing, where a more important wound inflicted by an instrument would readily yield to simple remedies. I have under my attention several and most complicated cases of blood poisoning, in which the patient had but slightly abraded the hand in the course of a fight by striking the knuckles against the teeth of his opponent. I have known hands thus poisoned only saved from amputation by the application of all the resources of science. Tobacco or whisky, or disarrangement of the stomach from many other causes, may be responsible for this poisonous condition of the teeth, and I am not prepared to say that a man with good health and a clean, sweet mouth would convey the poison, but I can only speak of the frequency of this class of cases and the difficulty of attending them successfully."

**TOO MUCH HUGGING AND KISSING OF CHILDREN.**—It is precisely in that natural aptitude for emotion, in that type of mind which is exquisitely sensitive to impressions and generously swayed by sympathetic feeling, that one of the great dangers to the perfection of womanhood, physical and mental, may be said to reside. Many and varied influences tend to in-

crease this emotional excitability until it often becomes a fixed habit of mind; as undens sensibility of the supreme centers to emotional ideas is created, which can only be maintained at the expense of sound health of body and of mind. First among these are certain home influences that are brought to bear upon a little girl from her earliest childhood, which foster in her self-consciousness and introspection. Dr. Taylor says: "In my large practice among children I am certain that scores are literally killed by the excessive amount of emotional excitement which they are forced to endure. All this hugging and kissing and talking to them is to excite responses of the same emotional nature in the child for the pleasure and gratification of the parents and friends." And again he says: "I believe that three fifths of the spinal diseases which occur in children are directly traceable to mental overaction. And this because a large proportion of these cases get well without other treatment than a withdrawal from the exciting cause of emotional disturbance."—*Pop. Science.*

**DANGER IN FALLING TREES.**—Danger from falling limbs continually lurks in the redwoods during the working season, and many accidents, fatal or otherwise, are reported every season. When a heavy tree comes crashing to the ground branches are broken off by coming in contact with neighboring trees. These great limbs lodge and sometimes remain in that position. But often, and when least expected, a breath of wind will loosen them from the lodgment and hurl them on the head of the workmen below. Close watch for these dangers has to be kept by those employed in the redwoods.

## USEFUL INFORMATION.

**ARTESIAN WELLS LONG KNOWN IN CHINA.**—The more we learn of China, the more we are astonished at the multiplicity of devices, long known there, but more recently of independent discovery among the civilized nations of the earth. It has recently been learned that the Chinese have been using artesian wells, even through the hardest rock, from time immemorial. The French Abbe Huc, lately returned from an extensive tour and long residence in China, describes the process of boring these wells employed there as follows: "A wooden tube six feet in length is first driven down through the surface soil. This tube is held at the surface of the ground by a large flag-stone, having a hole in the center to allow the tube to pass through and to project a little above it. A cylindrical mass of iron, weighing about 400 pounds, hollow and pointed at its lower end, and having lateral notches or apertures, is jerked up and down in this tube at the end of a lever, from which it is suspended by a rope. This kind of "monkey" disintegrates the rock, the debris of which, converted into sludge by water poured in, finds its way through the lateral apertures into the interior of the cylinder. By raising the latter at intervals, this sludge is removed from the hole. The rate of boring in rock of ordinary hardness is one foot in 12 hours. Only one man is employed at one time to work the lever. By this means wells of 1800 feet deep are sunk in about two years by the labor of three men relieving one another every six hours."

**HOW TO CARE FOR SILVERWARE.**—To know how to take care of silver is a very important thing when one has any silver to take care of. A good deal of valuable ware is reduced to a condition where it is fit only to be melted by improper cleaning and careless handling. Silver articles when not in use should be kept in prepared cotton flannel bags to protect them from the sulphurated hydrogen of furnaces and illuminating gas. They should be kept in a dry place, and, if likely to remain a long time, the silver should be perfectly clean and the bags closely wrapped in stout paper. For daily care of silver it is best to use hot water, castile soap, a stiff brush and chamois leather. In using plate powder to restore the brilliancy one should always go to a reliable silversmith for a good article, as much of the powder indiscriminately sold is no better than a fine sawdust or a lot of quartz, and wears off the surface of the metal. Gilding ought to be rubbed as little as possible, and silver stoved, decorated with colored alloys or oxidized, can be kept in condition by rubbing with a damp linen cloth with a very little plate powder.

**A MARINE NOVELTY.**—A press telegram from Cincinnati, O., says: A wonderful little watercraft was put through a test on the Miami river yesterday and attracted much attention. It is called the marine locomotive, and is intended for pleasure riding. The wheels are both air and water tight. The model used was 10 feet long and a weight of eight persons was placed aboard of it; and the machinery, although only of clock-spring make, caused the small boat to make an average speed either way, of from 14 to 18 miles per hour. This peculiar craft is the invention of Captain Peter Eichels. He proposes making a more complete test of a larger and better appointed vessel on the river and the canal. He is sanguine that a boat of this class, fully equipped, will be enabled to make a speed of 30 miles per hour.

**MAGNETIC PROPERTIES OF IRON.**—A series of experiments, with a view to determine the temperature at which soft iron becomes non-magnetic, have recently been carried out in the

laboratory of the Sorbonne, by M. Ledehoeer. The bar of iron experimented on was first insulated by being completely covered with mica, over which was wrapped a helix of platinum wire, and the whole was then placed inside one of two exactly similar induction coils, which were connected with a Wheatstone bridge, so that their relative self-inductions could be compared, and would, of course, be equal when the iron lost its magnetic properties. The bar was heated by passing a current through the platinum helix mentioned above, and the rise of temperature was measured by means of a thermometer. The results obtained were that up to a temperature of 680° Cent. the iron preserved sensibly the same magnetic properties as when cold, but beyond this temperature the decrease of permeability was very rapid, and the bar became completely non-magnetic at 770° Cent.

**TO DETECT ALLOYS IN GILDING.**—A solution of chloride of copper will show the difference between gilding for which gold has been used and gilding with alloys of inferior metals. If the gilding be imitation gold, a touch of the solution will give a black mark, copper separating out through the zinc in the yellow metal; with pure metal no discoloration will occur. The test can also be effected with a solution of chloride of gold or nitrate of silver, the first of which will give a brown spot, the second, a gray or black spot; neither has any effect on gold. Common gold goods of 14-karat gold will not change their color with nitrate of silver. Leaf-gold is tested by being shaken up in a closed bottle with sulphur chloride. Beaten gold will show no alteration, while "metal" leaves will grow gradually black.

**SUBSTITUTE FOR GUM ARABIC.**—A substitute for gum arabic, patented in Germany, is made as follows: Twenty parts of powdered sugar are hoiled with seven parts of fresh milk, and is then mixed with 50 parts of a 36 per cent solution of silicate of sodium, the mixture being then cooled to 122° F., and poured into tin boxes, where granular masses will gradually separate out, which look very much like pieces of gum arabic. This artificial gum copiously and instantly reduces Fehling's solution, so that if mixed with powdered gum arabic as an adulterant, its presence could be easily detected. The presence of silicate of sodium in the ash would also confirm the presence of adulteration.

**NEW MAGNESIUM LAMP.**—M. F. Leclercq, Paris, is about to bring out a new magnesium lamp, which is intended to replace the cumbersome and uncertain lamp hitherto in use. In the old lamp there were two magnesium tapes fed by clockwork, which had to be rewound at frequent intervals. In the new arrangement there is only one tape, and it is claimed that the lamp will burn without adjustment for 27 hours. Great improvements have also been made in the manufacture of magnesium, by which the cost of production has been considerably reduced. A firm in Antwerp is now selling magnesium at the rate of 1s. 10d., say 45 cents per pound.

**LONG DISTANCE TELEPHONE IN FRANCE.**—It is expected that the telephone will be ready to work between Paris and Marseilles on July 1st. The wire will be of bronze, and will be underground as far as Nogent-sur-Marne, where it will join the railway telegraph line. The distance is 500 miles, rather more than double that from Paris to Brussels, but the experiment of connecting the two wires between those places—the voice thus going from Paris to Brussels, back to Paris, and then again to Brussels—is considered a proof that communication will be easy.

**THE HEAVIEST BLOCK OF MARBLE.**—In the Devonshire quarries, in England, an enormous block of marble has been successfully removed, 65 feet long, 30 feet high and 25 feet thick; the weight of which is estimated at over 3000 tons; therefore, up to the present, it is the largest mass of Devonshire marble which has been discovered. This block, of a greenish black, is fine and even variegated with red veins. Already 12 columns and 8 pilasters 20 feet in height have been cut from it for the bank of Messrs. Wright of Nottingham.

**CASTING STEEL WHEELS.**—To give a greater solidity and density to the metal for wheels, it has been suggested, while the casting is cooling to give it a rapid rotary movement near the edge where it will ultimately work in. The centrifugal force gives the desired result, in pressing the liquid metal against the outer parts. This process, used in England by Mr. Webb some years ago, has lately been put in practice in a Pittsburgh foundry.

**PROTECTION OF BOILER TUBES.**—In order to prevent the rapid burning out of the front end of boiler tubes, a corrugated shield or inner cover for each tube has been devised. This shield, which may also be made with a plain surface, is to be applied at the end of each tube at the point of connection with the fire-box of the boiler. It is removable and can be easily removed when it becomes unserviceable.

**PENCIL FOR WRITING ON GLASS, ETC.**—The new pencils introduced by Faber for writing upon glass, porcelain and metals, in red, white, and blue, are made by melting together spermaceti, four parts; tallow, three parts, and wax, two parts, and coloring the mixture with white lead, red lead, or Prussian blue, as desired. These pencils are convenient in the laboratory, and save the trouble of labeling.

## ENGINEERING NOTES.

## Another Great Bridge Proposed.

The possibility of bridging the Hudson river between New York and Jersey City has been discussed before, and now we learn that Mr. Gustav Lindenthal, an engineer of some note, is maturing a plan for accomplishing the stupendous enterprise. An able engineer who favors the idea and sees no reason why the scheme cannot be made a success, exhibited to a reporter of the *Pittsburg Dispatch* a copyrighted lithograph of the proposed bridge, which Mr. Lindenthal has prepared from drawings. The bridge on paper is a magnificent structure of three spans. Beneath it are the largest ships in the world reduced in relative proportion to the size and height of the bridge, and it is found there is plenty of room for the tallest masts to pass under the colossus.

The proposition is to build a bridge across the Hudson from Jersey City to New York for the New York Terminal railway, over which all the roads centering in New York that carry passengers across the river in ferries can pass. In the city a union depot will be constructed. The advantage accruing as a result cannot be questioned. It is of the immense proportions of the bridge itself, however, of which I propose to speak. The nature of the river is such that, in order not to interfere with navigation, it will have to be crossed with one span, which must be in length 2550 feet, about one-half a mile. At once people will say that it cannot be done and it is useless to think of it. This is not to be an ordinary bridge, and the materials used will have to possess extraordinary strength to resist the strain and pressures. For example, it is calculated that the cables will each have to be four feet in diameter, or as large around as a hoghead in which china ware is packed.

Two towers will be built, each 500 feet high, down to the wharf lines, and the monster cables will be swung fastened in a mass of masonry 300 feet long, or, to be more explicit, as much as would cover a square in a city. Between the towers and the masonry two shorter spans, both together about the length of the middle one, will be suspended. Three spans will complete the bridge, and make it about a mile or more long. This is the scheme to which Mr. Lindenthal is devoting his time. The bridge will be wide enough to hold six tracks and strong enough to carry six trains at the same time.

**IMPROVING THE OHIO RIVER.**—It is proposed to improve the Ohio by constructing 12 dams between Pittsburgh and Wheeling, similar to that at Davis Island. It is proposed to put in five immediately at an aggregate cost of \$1,000,000. In addition to the advantages which will inure to navigation, it is proposed to utilize at least one of the dams for water-power, the power to be conducted to such places as may need it by electricity. A bill has been introduced into the Legislature of Kentucky to incorporate a private company for this enterprise with a capital of \$2,500,000. An Ohio exchange in alluding to the improvements referred to, says: "There have been efforts made to induce the Government to dig canals here and there. Concerning this we at present have nothing to say, except to express the opinion that at least some of them should be dug. But here is a canal made by nature, 1000 miles long and wide enough for a man-of-war, and which connects with other natural canals many more thousands of miles in length. These canals drain a region as vast as all Europe. All that the great Ohio canal needs is improvement, and surely this should be done, and as speedily as possible. There is no improvement the Government could make which would confer benefit on so many people, or on such a great scope of country, or on interests so vast and varied. This improvement is greatly needed; it is the duty of the Government to make such improvements; there is plenty of money in the Treasury with which to make this one; let it be made without unnecessary delay. We trust that in this instance Congressmen will be practical, and wise, and just."

**TOBACCO BLINDNESS.**—This infirmity, it is said, is becoming a common affliction. At present there are several persons under treatment for it at one London hospital. It first takes the form of color-blindness, the sufferers, who have smoked themselves into this condition, being quite unable to distinguish the color of a piece of red cloth held up before them. Sometimes the victim loses his eyesight altogether. Tobacco being a narcotic, naturally benumbs the nerves. When the nerves are thus benumbed people do not see as distinctly, and this defectiveness of vision tends to increase and become permanent.

**CANAL CONSTRUCTION IN CANADA.**—Canada has already expended \$50,000,000 on account of canal construction and enlargement, and the scheme giving a 14-foot draft from Lake Superior to tide-water, the Minister of Railways and Canals says, will require \$12,000,000 more. The total appropriation on account of canals which Parliament is now asked to grant is \$3,127,000. Of this amount \$997,000 is wanted to begin the construction of the Sault Ste. Marie canal, connecting Lakes Superior and Huron, to furnish Canada a national waterway independent of the United States canal near that point.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**DOYLE MINE.**—*Ledger*, April 14: This mine in Hunt's gulch was again bonded last Saturday to James Geason. The bond runs for eight months, and the purchase price is \$20,000, payable as follows: \$500 in one month, \$500 in four months, balance in eight months. It is hoped there will be some development work done on this promising property under this agreement. There are excellent indications of a good mine on this claim.

**NEWTON COPPER MINE.**—The Newton copper mine has changed hands. H. D. Ranlett, who is a business partner of J. A. Ferson, has become the purchaser. A number of men have been put to work preparing pits to roast the immense piles of ore now awaiting treatment.

**PLYMOUTH CONSOLIDATED.**—The fire in the Plymouth Consolidated mines is still raging. Every plan devised for extinguishing the fire has proved unavailing. The project of building an air chimney over the Empire shaft to create a greater draft and draw the smoke away from the Pacific has been found useless for practical purposes. A strong feeling exists that the only effectual way of putting out the fire is by flooding. This of course will do a great deal of damage, but if it has to be resorted to, the sooner it is done the better.

**MISCELLANEOUS.**—There is a report in circulation that negotiations are in progress for the sale of the Quartz Mountain mine to Eastern capitalists. The Moore mill is being repaired and fitted up with plates preparatory to being started up. It is reported that it is merely for the purpose of crushing the ore on the dump, which consists of several hundred tons. It holds out no immediate prospect of the resumption of work upon this mine, which is full of water, and will take considerable time and money to get it in running order again. Grading for the 60-stamp mill of the Amador gold mine will commence the end of the present month.

## Calaveras.

**STRUCK GRAVEL.**—*Calaveras Chronicle*, April 14: A bed of gravel was struck in the A & B mine, one day last week, in the bottom of the incline tunnel at a depth of 600 feet. The gravel prospects well.

## El Dorado.

**GRIZZLY FLAT AND VICINITY.**—*Placerville Observer*, April 10: With a concert of action and a little industry on the part of her people, there can be no doubt that Grizzly flat will soon be self again. In the north level from Station No. 1, at the Big Bonanza mine, a large vein of very fine ore is being developed. The ledge is well defined, being 12 feet in width between walls of gold-bearing vein matter, mostly quartz of a laminated character showing free gold and sulphides. The Melton mine has a tunnel in several hundred feet, showing a large vein of rich ore. The manner in which this mine is being opened, with a view to economical working, is a guarantee of success. The Young Bonanza Co. have their shaft down 75 feet and are running a level on a three-foot ledge, from which they are now working ore which is paying regularly \$28 per ton. The Sunday mine is now lying idle, the owners not having means to prosecute the work. The Mount Pleasant Co. are now sinking the shaft on the Ohio mine 30 feet south of their south line, from which they intend to drift north to their own ground. This shaft will open a large ore body which was partially opened in early days, and is known to exist on the north end of the Ohio mine and the south boundary of the Mount Pleasant, and will soon be an important development. Hoisting works will soon be erected on the ground. The Kemp has a large vein of low-grade ore, but is most favorably situated for economical working and can be made a profitable mine. There are a great many mines in the district partially developed and known to contain rich ore. S. A. Lane has bonded the Stillwagon to San Francisco parties, who are now at work making developments. At the Parker mine a 10-stamp mill is about completed and will be started up in a few days.

## Monterey.

**LOS BUENOS.**—*Cor. Salinas Index*, April 14: Work was begun on the Manchester a day or two since. The vein is opened out to a foot and a half in width. It proves to be far richer than anything they have found, and shows free gold all through the rock; one piece, weighing about 20 pounds, is on exhibition and is a beautiful specimen. It is estimated that this ore will mill \$200 per ton. We look for a second Last Chance in this claim very soon. The tunnel has been started on the Last Chance and two shifts are working day and night. This tunnel will tap the lower vein at a depth of about 100 feet and drain the mine. It is the company's intention to build a new mill of greater capacity. The contract for 100 feet on the Esmeralda is finished. The Ajax tunnel will be continued next week.

## Fresno.

**FRESNO COUNTY COPPER MINES.**—*Fresno Examiner*, April 11: One of the future great industries of Fresno county that is now attracting attention is the copper mines lying north of the San Joaquin river. Several years ago some of these mines, especially the Buchanan Hollow and Ne Plus Ultra, were worked on a paying basis. These mines proved to be rich in copper with a percentage of gold and silver large enough to be handled to advantage. The mines consisted of a central ledge with stringers covering over 100 feet of ground joining to the main vein as they go down. The Buchanan Hollow mine is to be put in operation at an early date, now that the price of copper has advanced in the market. The owners of the Ne Plus Ultra will probably sell that valuable mine or put it in operation soon. This mine is near the branch road to Raymond on the old Daulton rancho, and the patent calls for over 60 acres lying along the lead. This mine paid well and was rich in copper. However, the low prices of late years have proved detrimental to the copper-mining interests. At the time mining ceased on these mines they were remote from the railroad, and transportation was expensive, but now that the mines are on the line of the railroad and prices are advancing on the metal, we may

expect a good report from them at no distant date. Different parties have been examining these properties with a view of negotiating for them.

**A NEW LEAD IN HILDRETH.**—*Fresno Examiner*, April 11: From parts sent down from Hildreth to-day the information is obtained that James and Thomas Baker of Fine Gold have discovered a new ledge which promises, on account of its inexhaustibility, to be one of the most valuable gold mines yet discovered in that locality. The mine is located near what is commonly known as the Coon place, and two miles from the James mine. Already a number of tons of the ore have been placed on the dump, and assays made show the rock to be very valuable, running all the way from \$150 to \$200 per ton.

## Inyo.

**LOOKING WELL.**—*Inyo Independent*, April 14: The mill at Beveridge is running on Keynot ore. The mine is reported to be looking well. For some months past negotiations for the sale of the mine have been in progress, and it is said that the bargain is now very likely to be made.

## Nevada.

**THE DAYLIGHT.**—*Nevada City Herald*, April 13: The ledge known as the Daylight, which is located at Helgerson Flat, near Mayburt, is likely to put out some bullion this summer. The owners have been putting up a small mill and have it all ready to run. The rock in the Daylight has paid as high as \$60 per ton, and it is confidently believed the same kind of ore will be encountered again.

**A CANYON CREEK MINE.**—We are told that Tom Simons, who is working the Norway mine, is meeting with good prospects. The mine is owned by Mrs. Robinson, who used to keep the Central House on the Washington road. Simons leased the property last fall and commenced work. The mine has a mill and other improvements on it. It is situated on the mountain-side, midway between the North Bloomfield ditch and Canyon creek. The ledge is small, but very rich ore is frequently encountered in it. They are now crushing and the ore is turning out well. About a mile west of the Norway, Wm. Yaw is at work on the Dower mine and another adjoining, in both of which he is getting very flattering prospects. The Helgerson and Kohler claims are located down by the creek, and the owners propose to do development work on them this summer. Canyon creek district will be a bullion-producer one of these days.

**SAID TO BE SOLD.**—*Nevada City Herald*, April 11: Judge John Caldwell to-day received a letter from E. Charonot, who is in San Francisco, stating that a sale has been concluded of the Nevada City mine. Thirty thousand dollars is about the indebtedness of the mine, for which liens were filed and suits for settlement were in progress. At least this much in cash has been or will be paid, and it will go into circulation in this vicinity where all the creditors reside. It will further increase business here by the employment of men, and it will stimulate other mine-owners to start up work. It is good news and will be hailed with delight by every one.

**THE SPANISH MINE.**—A FLATTERING OUTLOOK. We are informed by a recent visitor to the Spanish mine that it is looking better to-day than it has for a long time. A recent upraise of 300 feet has developed better paying ground than has been found for years. This development affords fully a 3 years' run without further deadwork. The material now shown has better pay in it than anything encountered for years. The body is over 300 feet in width on the surface. Four nuggets of gold were found in making the upraise, the largest ever taken out of the mine, and their finding is an unusual thing. The superintendent is feeling very hopeful now, for he has had so many discouraging circumstances to overcome that it is like coming from darkness into light to get better prospects. If things continue as favorable as at present, Mr. Bradley will bring the mine out all right, pay off its indebtedness and leave the stockholders with a good paying property. If it does not, it will not be the fault of the superintendent. He has stuck to the mine through all its discouragements and deserves success.

## Placer.

**STRUCK IT RICH.**—*Newcastle News*, April 11: The quartz ledge on Bald prairie, near Newcastle, being prospected by Dr. Schnabel, B. M. Berry and A. O. Bell, has developed into a bonanza. The rock is said to be alive with gold and the ledge is a large one. It is estimated that on Monday last the prospectors took out over \$600 worth of ore, and the indications are that the lode is a very extensive and valuable one. The announcement of the big find caused quite a flurry in Newcastle on Monday, and the owners are justified in feeling considerably elated.

## Sierra.

**THE LINK MINE.**—*Nevada City Herald*, April 11: Dr. J. H. Freeman is down from Sierra county, where he is developing a drift property called the Link mine. It is located about 6 miles east of Alhambra, and 2 miles south of American Hill. W. D. Vinton and J. S. Holbrook are the other partners. It is expected, when drifts are well opened, that the mine will be very productive. In the near vicinity are numerous quartz veins, but little work has been done upon them as yet. About 2 miles above the Link is located the Pilgrim quartz mine. It will be remembered that the superintendent of this mine was found dead about 2 years ago, and it was supposed he was murdered. The mine has not been worked since that event, but is now being started up again, and is said to be looking well. The Sager drift mine is located about a mile and a half west of the Link. It is looking well and the prospect is fair of its becoming a valuable mine. Prospecting and developing of mines is going on all over Sierra county, and its prospects were never better.

**ST. LOUIS.**—*Cor. Sierra Tribune*, April 14: Everything is looking favorable in this section. The mining interest is flourishing. The Caledonia Co. of Cedar Grove is taking out good pay close to the Excelsior line, with the bedrock pitting toward the Excelsior. The Excelsior tunnel is still progressing toward the main ridge. It is now in about 430 feet, and the contractors are still working night and day. The Treasure Bros. of Gardner's Point are still driving their main tunnel ahead with the hopes of striking one of the richest mines in Northern Sierra. The Riffe Co. of Grass Flat is now working from 10 to 15 men, and their ground is paying from \$5 to \$10 a day to the man. They let a contract a short time ago for 300 feet on the main tunnel, and the

shareholders think that they have one of the finest paying claims in this section. The Union Consolidated of Happy Hollow is driving its tunnel ahead as fast as a Burleigh drill can do it, and at last report they were working 15 white men. The contractor, John Frisbee, expects to have his contract of 1500 feet completed about the first of September.

**DIVIDEND.**—*Mountain Messenger*, April 14: Bald Mt. Ex. Co., April 9th, declared dividend, No. 17, of five cents a share, aggregating \$3000.

**AT SIERRA CITY.**—*Cor. Mountain Messenger*, April 14: No. 9 tunnel, at the Sierra Buttes quartz mine, is in a distance of 8500 feet and still going ahead. A contract has been let to run the tunnel at the Parry Consolidated mine, 200 feet, to J. Perry, H. Rich and others. Two men have commenced work at Secret Mount and will run west on the ledge.

**YOUNG AMERICA.**—The mine looking first-rate in the several steps. No. 3 is also looming up in good shape, which makes the shareholders smile; and in general, the whole hill looks and works well under the management of the several officers.

## Siskiyou.

**QUARTZ AND PLACER.**—*Yreka Union*, April 14: Judge Shepard of San Francisco, who is at the head of the company working the Quartz Hill mine at Scott Bar, was in the city this week. We are informed that he has organized a new company to open a 40-foot ledge on the west side of Scott river, above Scott Bar. This ledge was first prospected by Dick H. H. H. Different capitalists have been after the Schroeder & Werner quartz mine on Deadwood, but the owners could not be induced to set a price on the property, not caring to sell. Last week, however, they were besieged harder than ever, and fixed the price at \$160,000. The silver ore discovery made by Perry Merwin at the headwaters of Trinity on Scott mountain has been relocated. Hon. R. H. Campbell's hydraulic mine in Quartz valley, from appearances, will yield this season not less than \$40,000. The new elevator keeps the six-foot flume full and is working satisfactorily. The electric lights are also working fine. The blasting charges, for caving down the deep banks, are set off by electricity. Heckatome's mine on Greenhorn is paying well. Every now and then a pocket is struck yielding from \$15 to \$700.

## Tuolumne.

**NOTES.**—*Sonora Democrat*, April 14: John Neal is moving his Huntington mill from the Tuolumne river to a place near Brown's Flat. The Longfellow mine, near Groveland, which in the past has yielded immense amounts of gold, is now being reworked, and the present management anticipate big developments. Messrs. Baulich & Mandich Bros. are getting some fine prospects in their mount in claim. Crossings are encountering the lead every foot or two, and the probability is that a pocket will soon be discovered. The Bonanza mine is continuously rewarding its owners by a generous yield of the precious metal. Mr. Harper, from San Jose, went up to the Green mine this week with a force of men to reopen that property. It is reported by good authority that the Young Tuolumne mine, discovered by Hubert Shaw on the Tuolumne river, seven or eight miles from Groveland, gives promise of becoming one of the greatest mines in this country. It runs nearly north and south, obliquely across the country rock, which is slate, and follows up a high mountain, bordering the river. It varies from 5 to 15 feet in width, and from ore in the tunnel piercing the lead at the base of the mountain the lode will pay handsomely. Mr. Alvinza Haywood of San Francisco was in Sonora last week, and went up to the Eureka Consolidated (Dead Horse and Eureka). It is thought that a 20-stamp mill will soon be erected, and with a view to obtaining water for the mill and hoisting works, a ditch of 8 or 10 miles in length is now being surveyed. It will connect with the Tuolumne ditch near Confidence. From good authority it is ascertained that water for hoisting purposes will be on the ground in at least two months. It is fast time, but the company mean business.

**RUMORED STRIKE.**—*Tuolumne Independent*, April 14: It is rumored, on the streets, that another big strike has been made in the Bonanza mine, in Sonora. We hear sums stated all the way from \$20,000 to \$80,000. As to the truth or falsity of the rumors, we know nothing, as those in interest have given us no information on the subject. Such matters if true, help the country; but still it is a matter of private business, and if the parties direct in interest do not care to volunteer the information, we do not know that it is our province to go around with a gimlet and bore into individuals to extract their business secrets to satisfy public curiosity, or even to benefit Tuolumne county. It rather strikes us, in fact, that men who take large amounts out of her soil owe her a great deal more than we do. We are always glad to publish facts, but when asserted facts, as in this case, run into wild speculation, we prefer to wait official returns. So far as the lessees of the mine are concerned, the higher the figures the better we shall be pleased at their good fortune.

## Yuba.

**DRY-WORKING GRAVEL.**—*Grass Valley Tidings*, April 13: A lease of a portion of the once famous Golden Gate hydraulic mine at Smartsville has been made to Gideon Frisbee of the New York machinery manufacturing firm of Frisbee & Lucop. Mr. Frisbee will place on the ground his plant—a late invention—for dry-working gravel. He proposes to commence the work right off. Should the process prove successful—and on its face it appears perfectly feasible—the cement-gravel deposits of Nevada county may again be profitably worked and without sending down debris to our valley brethren, thus restoring in a great measure the old-time prosperity of a score of villages and hamlets. Several parties of lessees are engaged in drifting on the Golden Gate channel and are doing well. Compton & Co. started up an arrastra on Friday, a Pelton water-wheel operating it. Another company of lessees this week got into gravel which yielded \$1 a pan.

## NEVADA.

## Wahoe District.

**BULLION.**—*Virginia Enterprise*, April 14: The winze is down 54 feet, and are now opening a station there to prospect the country at a depth of 640 feet.

**HALE AND NORCROSS.**—On the 400 level the

stopes are in fair-grade ore. On the 600 level are putting in square sets and have commenced stoping. The ore is high grade. From the 700 level are extracting the usual amount of excellent ore. During the week have hoisted 1518 tons of ore from these levels and have shipped to the Nevada and Mexican mills 1608 tons. Average battery assays, \$34.88 per ton. Have bullion on hand and previously shipped amounting to \$38,000.

**UTAH.**—On the 472 level from the top of No. 2 upraise have completed a station and advanced the west crosscut 25 feet; total distance from upraise, 44 feet. This crosscut has passed through the east clay wall, and the face is now in quartz and porphyry showing some value by assay.

**OCCIDENTAL.**—In the lower tunnel, 75 feet south of the north incline winze, the incline upraise has been carried up 13 feet; total, 25; and 150 feet south of the north incline winze the south drift has been extended 12 feet; total, 68. Have extracted 22 tons of fair-grade milling ore.

**BEST AND BELCHER.**—On the 425 level upraise No. 2, near the north line, has been carried up 28 feet; total, 86. The formation is clay and porphyry. The winze started at a point 50 feet south of upraise No. 2 has been sunk 16 feet. The formation is quartz carrying some value.

**CHALLENGE.**—The joint Challenge-Jacket north drift on the 1000 level is in a distance of 231 feet. Connection with the upraise was made last night, and now they will commence crosscutting east and west, having secured a good circulation of air.

**BALTIMORE.**—Are putting in a new pump of a capacity to handle 60 miners' inches of water. The work will be completed to-day or to-morrow, when work will be resumed in the north and northwest drifts on the 250 level.

**ALPHA AND EXCHEQUER.**—Are working on the 422 and 222 levels of Exchequer and on the 382 level of Alpha. Have started a winze 100 feet north of the Alpha shaft where there is a good prospect for ore.

**GOULD AND CURRY.**—Have extracted during the week 150 tons of ore from the 250 and 300 levels of fair-grade milling quality, which has been stored in drifts in the mine.

**CROWN POINT.**—The 400 level winze has not advanced since the last report, on account of the large amount of water it was necessary to bail. Will now raise from the 500 level to connect with it.

**SAVAGE.**—Are extracting ore from the several levels between the 400 and 900 stations, and are shipping to the Rock Point mill about 70 tons per day. Battery assays average \$32 per ton.

**CONFIDENCE.**—Are now shipping to the Brunswick mill for reduction 180 tons of ore daily, the average battery samples of which show over \$51 per ton.

**BELCHER.**—The 500 level south drift has advanced 25 feet; total length, 72 feet. The face is clay with streaks of quartz through it.

**KEYES.**—The south drift on the 240 level is in a very favorable formation with streaks of fine ore in the face.

**YELLOW JACKET.**—Are shipping 100 tons of gold-bearing rock daily to the Santago mill.

**HAYWOOD.**—Are drifting from the bottom of the winze 270 feet below the tunnel in ore.

**ALTA.**—Are hoisting sufficient ore from 825 and 1150 levels to keep the mill running.

**JUSTICE.**—All work has been temporarily suspended in this mine.

**OEST.**—Are working 15 men and milling rich ore at the Briggs mill.

## Aurora District.

**WILL RESUME OPERATIONS.**—*Esmeralda News*, April 14: Aurora, which in time past has yielded large quantities of the precious metal, appears to be taking on a new lease of life and will soon resume operations. It would not be surprising in the least to hear that 100 men were at work in the mines of Aurora.

## Eureka District.

**THE SILVER CONNOR MINE.**—*Eureka Sentinel*, April 14: The owners of the Silver Connor mine expect to ship about 200 tons per month during the coming summer. They have continued the tunnel through the ground purchased of Grif Thomas, and it is now in 300 feet to and through the ore body on the 300 level of the mine. Ten tons of ore were extracted from the tunnel in crosscutting the chamber, a distance of 20 feet. They will now raise to make connection with the old works. The distance will be about 25 feet, and it will be all the way in ore. The ore that has been taken out of the tunnel so far assays \$35 per ton, \$24 of which goes in gold, and it nets a handsome profit to the furnaces.

## Garfield District.

**PRODUCING BULLION.**—*Esmeralda News*, April 14: The Garfield mines, although not making a needless lot of noise, continue to employ the usual number of men, and their bullion shipment are as large as ever. There are numerous other bullion-producing mines in this county of which mention might be made, but the above named will suffice the purpose of this article.

## Hawthorne District.

**OPENING MINES.**—*Esmeralda News*, April 14: Hawthorne district, about which so much has lately been written, continues to furnish profitable employment for miners and prospectors. Very few men have gone into the district, with the intention of working, but what have been fully compensated for the time and labor expended, and in many cases, have cleared enough money—if properly cared for—from a few months' labor to make them comfortable for the rest of their days. Good mines are being continually opened up, and as soon as men of means can be made to understand the splendid opportunities for investment the district will boom as it never has. There is one thing which is absolutely necessary, and that is proper facilities for reducing the ores. There is low-grade ore enough on the dumps of the several mines, which cannot bear the expense of transportation, to keep a reduction works in constant operation for a period of at least five years.

## Silver King District.

**ORE.**—*Pioche Record*, April 11: D. McCarter came in Tuesday from Silver King district, where he



has been working for the past nine months. He states that he has taken out about 200 tons of ore, which he intends to sort down to 100 tons, and he thinks will average 200 ounces in silver per ton. Silver King district is about 25 miles from Bristol, in a westerly direction. Mr. McCarter thinks it worth staying with.

#### TUSCARORA DISTRICT.

**NORTH COMMONWEALTH.**—*Times-Review*, April 13: Work in the prospect shaft advanced 20 feet. New prospect shaft sunk 16 feet.

**NAVAJO QUEEN.**—North drift from west crosscut, 200-foot level, advanced 13 feet during the week. Rock turning much harder.

**BELLE ISLE.**—North drift on east lateral from east crosscut No. 1, 250-foot level, extended six feet. The rock in the face is somewhat harder.

**PONDERE.**—South drift from shaft No. 2 advanced six feet. Are extracting some good ore in this drift.

**NAVAJO.**—The stopes are yielding their usual amount and grade of ore.

**GRAND PRIZE.**—Upraise above the 300-foot level stopes extended up 17 feet; the ore continues and is high grade.

**FOUND TREASURE.**—Stope from chute No. 2 continues to yield the usual amount of high-grade ore. Southeast drift has advanced 10 feet.

**NORTH BELLE ISLE.**—North gangway, 400-foot level, extended 18 feet. The character of the rock remains much the same as at last report. North intermediate from No. 1 winze extended six feet, still in very rich ore. Started a stope north from the upraise and also another one 200 feet south on the vein from No. 3 crosscut, same level. The ore taken from the stopes just started is very high grade.

**NEVADA QUEEN.**—250-foot level: No. 1 west crosscut has been advanced 12 feet, and will break in to the ore in the next 24 hours; the ore cut further north is high grade and solid; assays, \$653 per ton. 350-foot level: East crosscut from north drift on east vein has been advanced 20 feet, cutting several seams of good ore. Upraise in the ore has been put up 12 feet; total, 48 feet. Ore taken from this point during the week has been very rich, showing heavy in ruby; top of raise is all in ore, looking as well as at any time since starting.

**COMMONWEALTH.**—150-foot level: South drift has been extended seven feet. Upraise from south drift has been extended up 19 feet, all in ore; work at this point has been stopped and ore chutes are being put in. No. 2 south drift has been advanced 18 feet; the formation is looking favorable for ore. North drift from bottom of winze has been advanced 23 feet in good ore, but not so rich as in intermediate drift above, but is improving every day; ore taken from this drift will mill \$200 per ton. The south intermediate drift has been advanced 10 feet in very high grade; assays average \$912 per ton, of which \$120 is gold; this drift shows very rich in face, both north and south.

#### ARIZONA.

**BRADSHAW DISTRICT.**—*Prescott Courier*, April 11: Crowned King, and Moody and Place mines, of Bradshaw district are remarkable for size and richness. N. C. Sheekles, who has had considerable to do with developing these mines during Mr. O. F. Place's absence, has a very high opinion of both mines. Latest assays of Crowned King ore were as follows: Gold, \$149.23; silver, \$2.54 per ton. A mill test gave \$70 per ton. They are the best developed mines in the county, being opened by tunnels, the combined length of which is fully 1300 feet. These mines are in slate format. Gold is increasing; silver diminishing. Company own a mill and 3 cars of machinery will be added right away. Contract for timber, fuel, etc., has been let. Mill will have every appliance for saving the metals. Wood and water are abundant. Papers for the sale to Chicago parties of three-fourths of the Senator mine were yesterday made by the present owners, Messrs. Hugo Richards and Geo. W. Bowers. Money will be paid to them in a few days. The purchasers will dry the mine, sink a new shaft and work the property in the right way. The other fourth belongs to Judge H. Brooks. James Allen, of Cherry district, is here feeling well on account of the good looks of mines in his camp.

#### COLORADO.

**BULLION KING.**—*Elk Mountain Pilot*, April 14: In the Bullion King mine, Supt. Repell has sunk a winze in No. 3 south level to connect with No. 4 level. The winze is about 500 feet from the main shaft, and further out than No. 4 level has been driven. The winze is in good ore all the way and gives evidence that the mine will have considerable ore to ship this summer. Matt Nicols came up from the Old Lot mine last week, and has gone to Irwin to get the Metzler concentrator in order to commence running. There is already 400 or 500 tons of ore on hand ready for operation, and the prospects are very flattering for a good summer's work.

**PROSPECTING.**—*Georgetown Courier*, April 13: The largest stockholders of the Lehanon Mining Co., the Republican Consolidated mines and the Centennial Co. have all been personally on the ground of their respective properties the past week. This is a most excellent feature of the new order of things, for if the heaviest investors will make their Colorado interests matters of personal concern they will be more fully convinced of the value of their mines and of the necessity of business management in their affairs. Hitherto resident managers have tried almost in vain to get shareholders to inspect the mines. Such visits will do a great deal of good to the county.

#### DAKOTA.

**MIDSUMMER.**—*Deadwood Pioneer*, April 10: Work goes steadily on at the Midsommer, with sufficient encouragement to warrant interested parties in believing a good-sized ore body will shortly be disclosed. Stringers and boulders of ore are constantly appearing in the shaft, while the formation through which the latter is passing is undergoing a gradual change. The placer season begins in about a week or ten days, and preparations are under way to work several bars on a scale more extensive than ever. Good reports are heard from the Pocobontas. The ore crevice on which a shaft was recently started is widening as depth is attained, while the quality of

the rock still maintains its previous high value. A report comes from the Seabury-Calkins that excellent ore has been found recently in a drift from the 160 level. Of what extent the strike is, our informant was unable or unwilling to state. The ore, however, is rich, and assays in bet 1 gold and silver.

#### IDAHO.

**NEW LODGE.**—Silver City *Avalanche*, April 9: Messrs. Bennett & Dupont have discovered a very rich lode above the old Whisky gulch lode in Whisky gulch. The lode was found where the water had washed the soil off the bedrock. The lode is probably the one that has thrown out rich float, for the discovery of which a great deal of work has been done. The gentlemen are to be congratulated on their rich find.

**ORO FINO.**—The Oro Fino group of mines is now being placed in condition to furnish ore for a go-stamp mill the year around. The tunnel or drift on the Sinker is being driven south rapidly, showing a well-defined lode of fair-milling ore. Levels that have been filled with water and slum for years are being cleaned out, and altogether things present a lively appearance about the mine. Our camp has not had a brighter outlook for years, and it is safe to predict that the Oro Fino group of mines will produce a large amount of money this year.

**SURPRISINGLY RICH ORE.**—*Wood River Times*, April 11: Some time ago some of the Mayflower leasers, despairing of making expenses, concluded to throw up their lease, and began putting things in order preparatory to doing so. In cleaning up the drift they gathered about a ton of first-class ore and somewhat more of second-class. This first-class ore they thought might just about pay their board bill, while the second-class was not worth shipping. They therefore sent the first-class ore to the Hailey Sampling Works, when, much to their astonishment, it assayed 999 ounces in silver and 42 to 43 per cent in lead. They thereupon screened their second-class stuff and sent it down, when it was assayed and found to carry over 500 ounces silver to the ton! The boys went to work again, expecting to do well.

#### MONTANA.

**THE GREAT FALLS SMELTER.**—*Great Falls Tribune*: The mammoth works for reducing and refining gold and silver ores, now in process of construction at Great Falls, will be the largest and best equipped in the world. They will be built in four sections, each complete in itself. The first will be in full running order by Oct 1st of this year. Work upon the second will be commenced at that time, while the former is in operation. Such will be the order of procedure until the entire plant is completed, involving an expenditure of over \$2,000,000. Some idea of the magnitude of this great work may be had from the following description of one section: Number of blast furnaces, 5; number of roast furnaces, 20; amount of building brick, 6,000,000; amount of fire-brick, 600,000; capacity per day (tons of ore), 200; number of cars per day (for transportation), 50; men employed in construction, 500; men employed in operating, 250. The blast-furnace building will be 168 by 100 feet. The roast-furnace building will be 408 by 100 feet. The sampling works will be 150 by 100 feet. The engine-house will be 150 by 85 feet. One smokestack will be 32 feet square at the base; 150 feet high and 12 feet square at the top. Another smokestack will be 28 feet square at the base, 125 feet high with a 10-foot square flue.

#### NEW MEXICO.

**PRODUCTION OF SOCORRO COUNTY FOR 1887.**—*Socorro Bulletin*, April 7: The Rio Grande Smelting Co. is now engaged in adding a fourth stack; it will have a greater capacity than any of the other three. It will be 3½ x 10 feet at the tuyeres, also flue-dust catchers and condensers. The building will be very materially enlarged, and another engine of 100-horse power is now upon the way. Other improvements and adjuncts will very materially improve and enlarge this well-known plant. *En passant*, it is not inopportune to inform our readers that the product of this plant for the year 1887 amounted in dollars and cents to the following sum, which will be very largely increased this current year: Silver, 1,112,453.47 ozs., @ 98 cts., \$1,090,204.40; lead, 10,340,085 lbs., @ \$4.75, \$49,154.04; gold, 3924.569 ozs., @ \$20, \$81,120.24; total, \$1,669,479.28.

**GRAPHIC MINING AND SMELTING COMPANY.**—We understand that the Graphic Mining & Smelting Co. is meditating a considerable modification of its smelting plant and an increase of capacity. During the year 1887 it produced the following amount of bullion: Lead, 4,305,296 lbs., \$189,726; silver, 200,399.24 ozs., \$201,724.49; gold, 604.46 ozs., \$12,149.36; total, \$403,599.85.

#### OREGON.

**THE CHLORIDE MINE.**—*Bedrock Democrat*, April 10: Prominent among the first-class mining properties of Baker county may be ranked the Chloride, situated about 21 miles northwest of this city and about seven miles from Haines, its nearest point on the O. R. & N. road. The mine is owned, and is now being developed, by the Chloride Consolidated M. Co. Six men are now employed on an eight-hour shift. There now remains but 50 feet more tunneling to complete a 900-foot contract, after which the company will sink an incline on the ledge in a tunnel as deep as possible, to make it probably 100 feet. Having done this, it is their intention to crosscut in several places with a view of ascertaining the width of the ledge. The present yield of ore is high-grade milling, much of it being splendid shipping ore which will be sent to Denver for reduction.

**GRAVEL MINES.**—*Bedrock Democrat*, April 10: The gravel mines of the north fork of the John Day, Grant county, have been noted for many years for their extreme richness, and their gold output annually has been enormous. The mines are situated on the bars or banks of the John Day river, a rapidly flowing stream having its source in the Blue mountains and emptying into the mighty Columbia, hundreds of miles distant. The gravel mines in question have been worked more or less since 1862, and this spring several companies have commenced operations.

### List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, \$20 Market St., S. F.

FOR WEEK ENDING APRIL 10, 1888.

380,843.—**ORE PULVERIZER**—Baratini & Stevenson, Murphys, Cal.  
380,744.—**TWO-WHEELED VEHICLE**—K. A. Brigham, Gilroy, Cal.  
380,745.—**SPECULUM**—P. Chamberlin, Santa Cruz, Cal.  
381,059.—**METALLIC RAILWAY TIE**—W. H. Donaldson, S. F.  
380,888.—**STEAM-ACTUATED VALVE**—W. W. Hanson, S. F.  
380,895.—**GANG PLOW**—H. M. Irwin, Hanford, Cal.  
R. 10,921.—**FLOOR, ROOF OR AREA COVERING**—P. H. Jackson, S. F.  
380,782.—**SHOWCASE**—Chas. F. McGlashan, Truckee, Cal.  
380,918.—**ENGINE INDICATOR ATTACHMENT**—J. R. Mitchell, Oakland, Cal.  
380,763.—**FRUIT LADDER**—M. H. Murphy, Portland, Oregon.  
380,820.—**PRESERVING SUBMERGED TIMBERS**—H. L. Ricks, Eureka, Cal.  
380,821.—**CRUSHING-MILL**—A. E. Roe, S. F.  
381,032.—**CABLE GRIP**—A. E. Roe, S. F.  
380,700.—**DENTIFRICE**—J. Schwartz, Portland, Oregon.  
380,774.—**FEEDER FOR CAN-BODY MACHINES**—Jos. Stevens, S. F.  
380,831.—**CASH REGISTER**—E. T. Taylor, Oakland, Cal.  
380,840.—**HORSE-POWER PUMP**—H. D. White, Cottonwood, Cal.  
380,842.—**APPARATUS FOR EXAMINING ORES**—Williamson & Hickies, Oakland, Cal.  
Norm.—Copies of U. S. and Foreign patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

#### Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**CRUSHING-MILL.**—Alpheus E. Roe, assignor to Tatum & Bowen, S. F. No. 380,821. Dated April 10, 1888. This ore-mill we have previously described. It consists of two or more heavy weights having a series of stamps fitted into their lower convex faces, and dies upon which these stamps operate, together with a mechanism whereby the two series of oscillating stamps may be caused to move in opposite directions within the same mortar. Tatum & Bowen are manufacturing and selling these mills, which are found to be very effective.

**STEAM-ACTUATED VALVE.**—W. W. Hanson, S. F. No. 380,888. Dated April 10, 1888.

This invention of the late Mr. Hanson, who was quite an ingenious inventor, relates to certain improvements in direct acting engines such as are usually employed for actuating pumps and similar reciprocating apparatus. It consists in such a construction and arrangement of the parts as will greatly simplify them and facilitate access to the working parts, so that they may be adjusted or inspected by simply removing a single cover or plate. By constructing the main valve in the B form and the auxiliary in the D form, the auxiliary piston has its movement in the same direction as that of the main piston, and the inventor was thus enabled to dispense with all the reverse motions for the auxiliary piston, and devices for producing it, thus reducing the number of parts outside of the cylinders, and the chest to a single tappet-arm in the main piston-rod and the two tappets on the auxiliary piston-rod. This does away with all sliding joints and decreases the wear of outside valve-motion and the necessity of the frequent adjustment of the same.

**CABLE-RAILROAD GRIP.**—Alpheus E. Roe, assignor of one-half to John H. Bolles, S. F. No. 381,032. Dated April 10, 1888. This mechanism is an improved one for connecting cars with an endless traveling cable which moves in a tube beneath the roadway. It consists of short endless chains passing around rollers which are journaled upon a frame depending from the car, and so placed that one of the chains will stand above and the other below the cable. In combination with these is a mechanism by which the cable is gripped between the chains or released therefrom for the purpose of starting or stopping the car, and a mechanism by which the lower grip may be thrown to one side to release it from the cable. With this grip the car may be returned from the end of this line without being reversed.

**FLOOR, ROOF OR AREA COVERING.**—Peter H. Jackson, S. F. No. 10,921 (re-issue). Dated April 10, 1888. This invention relates to certain improvements in fire-proof floors, roofs, pavements or area-coverings. It consists of a surface of artificial stone or concrete, either with or without glass set therein for illumination. In a previous patent the inventor shows metallic supporting beams which extend outward from the building, and are fitted to support the ends of the corrugated plates or plates that extend between the beams. These corrugations, which form the strengthening plate,

extend across between beams and parallel with the building front, the corrugated plates supporting a filling of artificial stone or concrete, the top of which forms the pavement or surface. These plates are usually perforated to receive thick glass which serves to light the basement or area beneath. In practice, Mr. Jackson finds that the corrugations which extend parallel with the building front, and which are of considerable depth to provide the necessary strength of plate, will cut off the light from the glass which is fitted into the plates so that it will not be thrown back into the basement as far as it should on account of the depth of the ribs or corrugations. The object of this present invention is to so construct the roof or covering that the light will not be cut off. The improved plates are placed so that the ribs or corrugations extend outwardly or at right angles from the front of the building so the ribs will not obstruct the light.

**SPECULUM.**—Philander Chamberlin, Santa Cruz, No. 380,745. Dated April 10, 1888. This invention relates to that class of surgical instruments termed "specula," and the invention consists in the combination of the annular hub, the spring-actuated arms pivoted to said hub, and the annular nut operating in the hub, and against the spring arms whereby they are expanded. This improved instrument is of simple construction and effective operation.

**TWO-WHEELED VEHICLE.**—Kasson A. Brigham, Gilroy, Santa Clara county. No. 380,744. Dated April 10, 1888. This is one of the class of vehicles commonly known as carts. The invention consists in the combination of an independently movable body, a peculiarly divided or sectional shaft, and a novel connection between the body and one of the sections of the shaft. This object is to provide for the independence of the body of the cart and the jointing of the shaft, and by a novel connection between the two produce this perfect result of overcoming the motion due to the joggling of this horse.

**STEAM ENGINE INDICATOR ATTACHMENT.**—Joseph R. Mitchell, Oakland. No. 380,918. Dated April 10, 1888.

The invention consists, broadly, in a novel connection with the card-bearing cylinder of the indicator, whereby the limits of oscillation of said cylinder are shifted to provide for consecutive separate diagrams on the indicator card, and, further, in such a connection as will effect said shifting at the time when the pencil describing the diagram is moving upon the exhaust line, or line parallel to the atmospheric line, whereby any distortion of the diagram is prevented. The invention consists, particularly, in a card for effecting the usual partial rotation of the cylinder, and which is so connected as to alter its length, whereby the cylinder is given or allowed to have an additional movement to vary the position of the diagrams on the card, and, finally, in the novel connection of the card, whereby its length is automatically altered. The invention has for its separate object the making of distinct and separate consecutive diagrams on the same card.

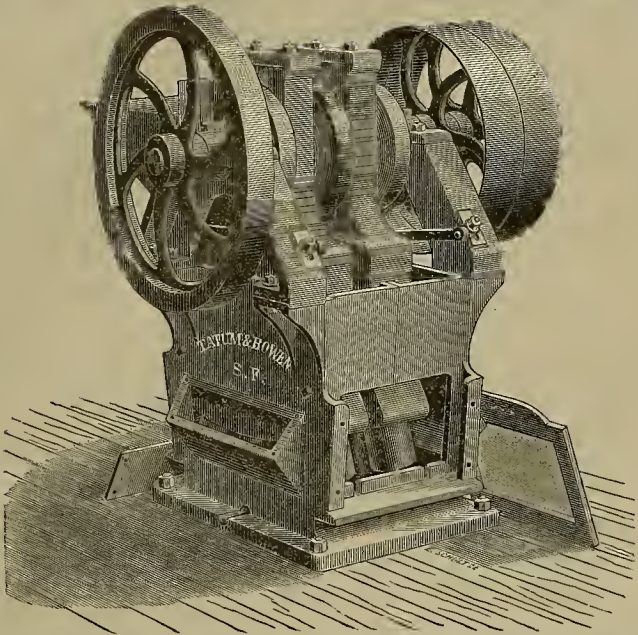
**ORE PULVERIZER.**—David Baratini, Murphys, and Wm. P. Stevenson, Douglas Flat, Calaveras county. No. 380,843. Dated April 10, 1888. This is one of that class of ore pulverizers or rock crushers in which a rolling weight operates within a rocking mortar. The rocking mortar is made with a convex inside surface, and through its center projects downwardly and upwardly a pin, the lower portion of which is fitted loosely in a socket in the bed plate, and the upper portion passes into a socket in the rolling weight. By means of this pin the parts are held in proper position, being steady even under rapid movement. The pin prevents the roller weight getting out of place. The roller weight is operated by a pitman in the ordinary manner.

**METALLIC RAILWAY TIE.**—Walter H. Donaldson, assignor of one-half to Robert H. Reid, S. F. No. 381,059. Dated April 10, 1888. The object of this invention is to provide a strong and stiff tie or sleeper and means for securing the rails thereto, which obviates the necessity of spikes and bolts, said means also providing for fixing the gauges with precision. The fastenings consist of two dogs or hooks. The tie is made of rolled or cast metal and consists of a top plate with outwardly beveled flanges and a longitudinal central or T web. The top flanges and web are perforated with rectangular slots for the reception of the wedges, and the dogs or clamps. Transverse wedges through the tie act on the lower ends of the dogs and cause their upper ends to clamp the rails.

**GANG PLOW.**—Hall M. Irwin, Hanford, Tulare Co. No. 380,895. Dated April 10, 1888. The improvement consists in the novel construction of the running surfaces or rims of the inclined wheels of the plow. The object is to steady and guide the plow by so constructing the rims or running surfaces of the inclined wheels that they shall present a broad surface squarely to the ground, and a surface squarely to the land side of the furrow previously made. By dispensing with the land sides of the plow bottoms, the friction is avoided, and by having the rims of the inclined wheels squarely on the ground the friction is avoided which usually occurs when using the ordinary inclined wheels of the plows of this class. The topline, which has heretofore been necessary to steady plows with inclined wheels, is also dispensed with.



— THE —  
**DOUBLE "ECONOMIC" STAMP MILL.**



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

**AN AUTOMATIC ORE FEEDER**  
Goes with each Mill. We also have a suitable  
**Rock Breaker.**

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

**TATUM & BOWEN,**  
34 and 36 FREMONT STREET, SAN FRANCISCO, CAL.  
Manufacturers of Mining and Sawmill Machinery, Engines, Boilers, Etc.

**THE RAND DRILL COMPANY,**  
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Are now so situated with their new works as to offer to the miners of the Pacific Coast small Air Compressing Plants at such prices that almost any small mine can afford to put in power drills if they have none in use.

By their new and patented systems (by which the duty or performance of drills is not reduced with use) it is no longer necessary to buy a Compressor of double capacity than the drills are expected to require, in order to keep up the supply of air necessary on account of the wear of drills and compressor.

Besides having the newest and lightest designed small drill plants, the Rand Drill Company, as is well known, has built, and is now building, the largest Compressor plants in this country, and has patterns for all sizes up to 40-inch diameter of cylinder.

In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

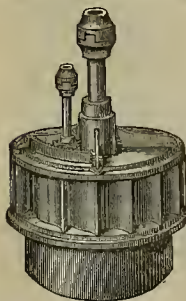
Since the reasons which formerly restrained them from the California market no longer exist, they are now in the field for the business.

**SPECIAL ATTENTION** is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.

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Manufacture Three Kinds of Powder, which are acknowledged by all the Great Chemists of the World as  
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Of Different Strengths as Required.  
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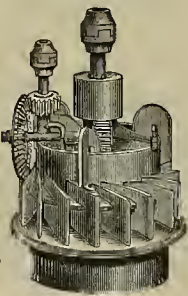
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**FOR RAILROADS AND LAND CLEARING.** Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

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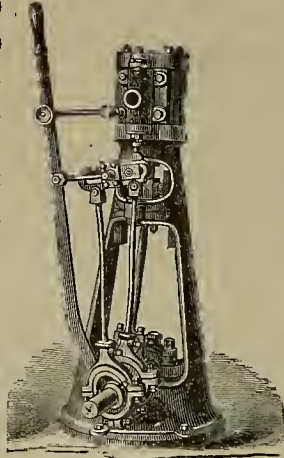


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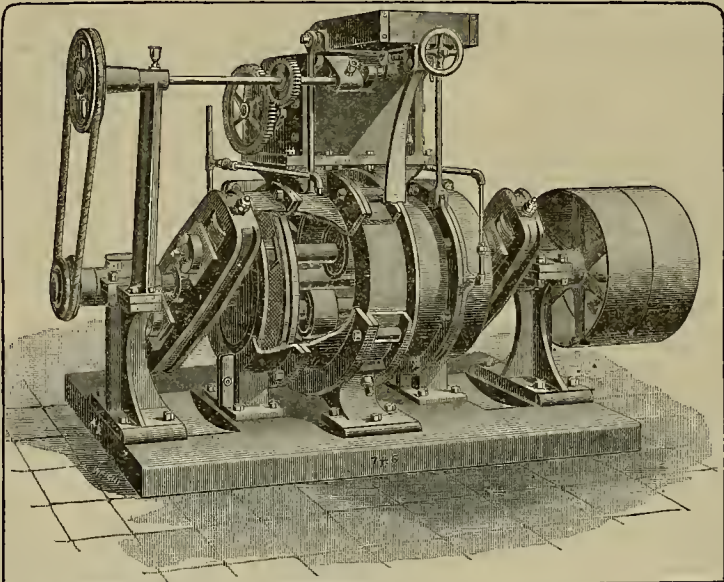
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**FRISBEE WET MILL.**

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



**IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,**  
And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.  
OUR DRY MILLS are the most economical ever built, and are extensively used with record of several years. No grinding in pans. Mill finishes to any fineness desired.

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**STURTEVANT MILL.**

This Mill as a Crusher and Pulverizer is without rival.  
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G. DENNISTON'S Silver Plated Amalgam Plates. The  
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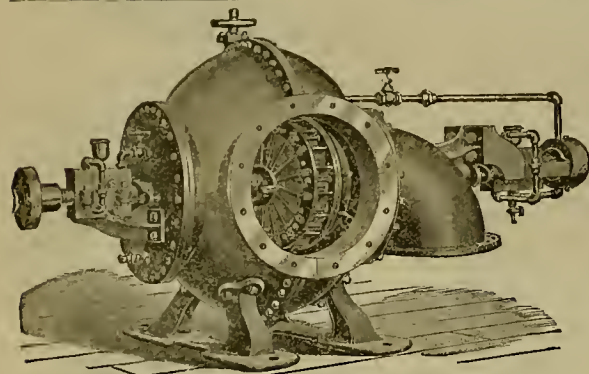
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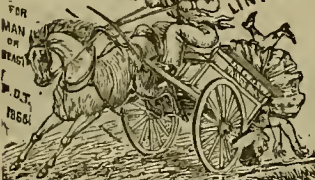
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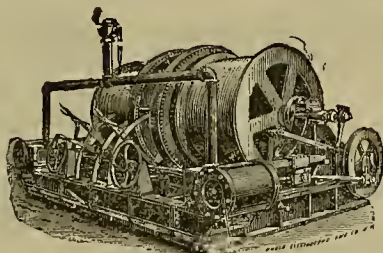
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FOR MINES.**1, 2, or 4 Drums, with Reversible Link  
Motion or Pat. Improved Friction.

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### Mining Share Market.

There is little new to report concerning mining stocks. The Reform Committee of the San Francisco Stock Board, appointed not long since, has done nothing, and the movement is at an end. On Wednesday, when the board assembled in executive session, it was determined to bring the matter to a crisis. Mr. Marve accordingly presented a resolution, which would test the disposition of the board and govern the future of the committee. It referred to the proxy system; was temperate in tone and carefully worded with regard to the insertion of any clauses which might state in dictatorial terms in the ear of the majorities in power. The power of the board to run its own business and protect its clientele was referred to incidentally in a mild preamble. The resolution was seconded by Coll Deane, and thereupon passed to a vote, which was lost by a small majority. The committee then resigned, and were awarded a vote of thanks for their services in the board.

The Virginia Enterprise says: Very few of our mining men pretend to explain the cause of falling values in stocks. Some claim that a great deal of money is now locked up in land speculation, and men will have to go through the process of breaking their financial necks and changing fortunes before there will be any great revival in mining-stock speculation. Others claim that there is a general belief that stocks will go lower, and they are dumping their shares on the market in the hope of getting in at lower figures, and thereby forcing many others to sell, because they have no money to make their margins good.

### New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department No. 1, San Francisco:

VALLECITO M. Co., April 17. Capital stock, \$1,200,000, in 60,000 shares. Directors—C. H. Livingston, T. B. Bishop, Sarah Mitchell, L. M. Hoeffer and H. R. White.

SISSON, CROCKER & CO., April 17. Object, to carry on a general merchandise and real estate business throughout the Pacific Coast. Capital stock, \$200,000. Directors—Albert W. Sisson, Clark W. Crocker, Samuel W. Cutter, Milo A. Burke and George W. Scott.

PACIFIC COLD STORAGE CO., April 17. Capital stock, \$100,000. Directors—W. H. Crocker, C. de Guigner, John Parrott, E. A. Rix and John E. de Ruyter.

GOLDEN GATE BUILDING ASSOCIATION, April 18. Object, to purchase land in this city and erect a building thereon for Golden Gate Commandery, No. 16, Knights Templar, and other organizations, lodges and societies. Capital stock, \$100,000. Directors—Frank Dalton, Frank W. Sumner, James H. Jennings, A. H. Vail, R. F. Osborn, Frank G. French, J. Z. Davis, H. J. Sadler, S. H. Seymour, William O. Gould and A. G. Booth.

SECURITY LOAN ASSOCIATION, April 18. Capital stock, \$1,000,000. Directors—William C. Hilderbrandt, Albert Abrams, Max Walter, Nathan Crocker, L. Lehenbaum, Gabriel Cohn, Manheim Marks and S. O. Alexander.

### San Francisco Metal Market.

WHOLESALE.		THURSDAY, April 19, 1888.	
ANTIMONY—French Star.		9	@ 91
BORAX—Refined.		7	@ 1
Powdered.		7	@ 1
Concentrated.		61	@
COPPER—			
Bolt.		26	@ 30
Sheeting.		26	@
Ingot.		—	@ 20
Fire Box Sheets.		—	@ 26
IRON—Glenbrook ton.		—	@ 30
Eggs.		—	@ 28
American Soft, No. 1, ton.		—	@ 30
Oregon Pig, ton.		21	@ 23
Clay Lane White.		—	@ 23
Shells, No. 1.		—	@ 31
Lead—Pig.		5 00	@ 12
Bar.		5 25	@ 6 50
Sheet.		8	@
Shot, discount 10% on 500 bag.		1 80	@
Buck, # bag.		2 00	@
Sheathing, # on 500 bag.		2	@
Steel—English, lb.		16	@ 20
Black Diamond tool.		10	@ 16
Pick and Hammer.		8	@ 10
Machinery.		6	@ 8
Toe Calk.		4	@
TINPLATE—Coke.		5 75	@ 6 50
Charcoal.		6 75	@ 7 25
QUICKSILVER—By the flask.		38 50	@ 40 00
Flasks, new.		1 05	@
Flasks, old.		85	@

### Bullion Shipments.

We quote since our last, and shall be pleased to receive their reports:

Confidence, April 15, \$15,163—total for April thus far, \$93,237; Savage, 15, \$7500; Mount Diablo, 15, \$8187; North Belle Isle, 14, \$40,000; Germania, 11, \$3383; Hanauer, 11, \$1750; Queen of the Hills, 12, \$2220; Hanauer, 12, \$1830; Cons. California and Virginia, 17, \$59,030—April to date, \$110,000.

### Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

JOHN G. H. LANFADUS—San Barbara Co.  
G. W. INGLE—Arizona Territory.  
W. M. WILKINSON—Fresno Co.  
A. J. FEWITT—Tulare Co.  
C. E. WILLIAMS—Yuba and Sutter Co.'s.  
R. G. HUSTON—Montana Territory.  
E. H. SCHAEFFER—Sacramento Co.  
F. B. LOGAN—San Diego Co.

A FORTUNE IN IT.—It is only once in a life-time that prospectors and miners who do the hard pioneer work have a chance to make a fortune. They are advised to consider well some information in this number of the PRESS "On Milling Ores." If interested, address J. A. Johnson, 307 Montgomery street, San Francisco.

J. A. JOHNSON, 307 Montgomery street (the Nevada Bank building) is the general agent of the Stiles quartz machinery, and offers easy terms for introduction.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

COMPANY.		LOCATION.	No.	AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSIN.	
Andes M Co.	Nevada.	5.	05.	Feb 28.	Apr 4.	27. J M Quay.	406 Montgomery St	
Belcher S M Co.	Nevada.	34.	50.	Mar 13.	Apr 7.	J J Crockett.	327 Pine St	
Bodie Com M Co.	California.	8.	50.	Feb 13.	Mar 20.	26. G W Sessions.	309 Montgomery St	
Butte Creek Hyd M Co.	California.	12.	05.	Mar 27.	May 7.	28. L E Levy.	213 Market St	
Baltimore S M Co.	Nevada.	1.	25.	Apr 10.	May 21.	June 8.	W L Brown.	402 Montgomery St
Crispin M Co.	Arizona.	5.	10.	Mar 7.	Apr 15.	May 1.	P H Leonard.	628 Montgomery St
Crocker M Co.	California.	5.	25.	Feb 15.	Mar 27.	May 1.	A Waterman.	368 Montgomery St
Crown Point M Co.	Nevada.	49.	50.	Apr 13.	May 16.	June 6.	J Newlands.	329 Pine St
Day M Co.	Nevada.	16.	1.00.	Feb 8.	Apr 9.	May 7.	R R Grayson.	327 Pine St
Equitable Tunnel Co.	Utah.	33.	15.	Feb 14.	Mar 30.	May 9.	C J Collins.	1018 Market St
Excelsior & M Co.	California.	11.	30.	Mar 20.	Apr 31.	May 9.	W J Stewart.	215 Sansome St
Gray Eagle M Co.	California.	6.	04.	Mar 6.	Apr 10.	Apr 30.	T Wetzel.	522 Montgomery St
Gould & Curry M Co.	Nevada.	58.	05.	Mar 12.	Apr 10.	May 10.	A K Durhrow.	309 Montgomery St
Kennedy M Co.	California.	3.	10.	Feb 20.	Apr 2.	Apr 28.	L F Reichling.	404 Montgomery St
Livermore Oil Co.	California.	2.	05.	Mar 6.	Apr 3.	Apr 28.	H Deas.	369 Montgomery St
Mayflower Gravel M Co.	California.	41.	25.	Apr 9.	May 14.	June 4.	J Morizio.	328 Montgomery St
North Peer M Co.	Arizona.	4.	05.	Feb 24.	Mar 28.	Apr 23.	H Deas.	369 Montgomery St
Navajo M Co.	Nevada.	13.	30.	Apr 12.	May 17.	June 7.	J W Pew.	310 Pine St
Phil Sheridan Con M Co.	Nevada.	3.	10.	Mar 7.	Apr 14.	May 5.	T F Holling.	533 Kearny St
Peerless M Co.	Arizona.	11.	25.	Apr 4.	May 7.	May 28.	A Waterman.	320 Montgomery St
Sierra Nevada S M Co.	Nevada.	81.	25.	Apr 3.	May 8.	May 28.	L J Parker.	368 Montgomery St
Trojan M Co.	Nevada.	17.	10.	Mar 27.	May 4.	May 28.	J F Holling.	533 Kearny St
Virginia Creek Hyd M Co.	California.	5.	05.	Feb 23.	Apr 4.	May 1.	J M Quay.	466 Montgomery St

MEETINGS TO BE HELD.			
NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.
Navajo Queen M Co.	Nevada.	J J Scoville.	309 Montgomery St.
Peahody M Co.	Utah.	P E Hilton.	109 California St.
Russell Reduction & M Co.	California.	J Morizio.	328 Montgomery St.
Sweet Vengeance M Co.	California.	J Howes.	328 Montgomery St.

LATEST DIVIDENDS—WITHIN THREE MONTHS.			
NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.
Con California & Va M Co.	Nevada.	A W Havens.	309 Montgomery St.
Eureka Con M Co.	Nevada.	H R P Hutton.	306 Pine St.
North Belle Isle M Co.	Nevada.	J W Pew.	310 Pine St.
Oregon Coal & Navigation Co.	Oregon.	R B Williams.	211 Sansome St.
Pacific Iron, Salt & Soda Co.	California.	A H Clegh.	230 Montgomery St.
Russell Reduction & M Co.	California.	J Morizio.	328 Montgomery St.
San Francisco Copper M Co.	California.	F E Berier.	320 Sansome St.
Standard Con M Co.	California.	J W Pew.	310 Pine St.

### Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING MAR. 23.	WEEK ENDING APR. 5.	WEEK ENDING APR. 12.	WEEK ENDING APR. 19.
Alpha.	3.05	3.50	3.65	3.25
Andes.	1.45	1.85	1.75	1.80
Argenta.	—	25	25	20
Belcher.	6.00	75	6.75	75
Bodie.	—	—	—	—
Bullion.	2.05	2.30	1.75	2.20
Baltimore.	1.05	1.20	1.00	1.10
Belle Isle.	—	70	70	80
Bodie Con.	2.65	3.20	2.50	2.90
Bodie Tunnel.	—	—	—	—
Bulwer.	—	15	15	10
Con. Va. & Cal.	145	104	14	15
Challenge.	—	12	13	11
Champion.	—	75	6.00	71
Chollar.	—	32	42	31
Confidence.	—	38	42	31
Con. Imperial.	5.75	75	6.00	6.50
Caledonia.	—	65	70	70
Con. Pacific.	—	70	70	70
Crown Point.	—	67	6.75	7.25
Crocker.	—	70	1.00	1.00
Central.	—	—	—	—
Dudley.	—	—	—	—
East B. & E.	—	—	—	—
Eureka Con.	131	135	104	12
Exchequer.	1.95	2.15	1.75	2.05
Grand Prize.	2.30	2.85	2.65	2.75
Gould & Curry.	—	4.70	4.80	4.25
Hale & Norcross.	102	11	92	101
Holmes.	—	—	—	—
Independence.	—	—	—	—
Iowa.	1.05	1.25	1.25	1.45
Jalia.	—	—	—	—
Justice.	1.40	1.65	1.40	1.55
Kentuck.	4.30	4.70	3.50	4.35
Lady Wash.	—	60	65	75
Martin White.	—	—	—	—
Mono.	—	2.90	1.75	2.90
Mexican.	52	61	5.50	61
Mt. Diablo.	—	4.25	—	—
Northern Belle.	—	—	—	—
Navajo.	1.20	1.20	1.50	1.15
North Belle Isle.	61	67	61	65
Niagara.	—	—	—	—
Nev. Queen.	3.45	4.00	4.00	4.40
North G. & C.	—	—	—	—
Occidental.	2.10	2.10	2.10	2.10
Ophir.	102	11	95	102
Overman.	2.70	2.95	2.75	3.15
Potosi.	51	6.00	61	51
Peerless.	1.40	1.60	1.45	1.50
Peer.	—	60	60	70
P. Sheridan.	—	—	—	—
Silver Star.	—	—	—	—
Savage.	—	61	71	61
S. B. & M.	4.80	5.00	4.75	5.15
Sierra Nevada.	5.90	5.90	5.50	5.90
Silver Hill.	—	90	1.00	75
Silver King.	—	90	1.00	85
Scorpion.	—	90	1.00	85
Synthetic.	—	20	20	20
Union.	—	2.30	2.50	2.30
Utah.	—	2.30	2.50	2.30
Yellow Jacket.	—	91	11	83

### Sales at San Francisco Stock Exchange.

WEDNESDAY April 19.	545	Hale & Nor.	92
850 Alpha.	2.70	50 Iowa.	1.45
250 Alta.	1.95	100 Justice.	1.25
400 Andes.	1.00	100 Keesee.	1.00
200 Baltimore.	700	30 Kentuck.	3.90
1250 Belcher.	77	240 Mexican.	4.90
131 B. & Belcher.	54	1235 N. Belle Ie.	61
50 Bullion.	1.80	500 Navajo.	1.80
100 Bodie.	2.55	345 Ophir.	1.00
100 Belle Isle.	550	1350 Overman.	2.50
250 Bulwer.	850	850 Peerless.	1.55
1950 Challenge.	91	100 Peer.	1.95
230 Chollar.	138	300 Potosi.	41
700 Con Va. & Cal.	138	430 Savage.	5.90
100 Crocker.	950	200 Scorpion.	750
425 Crown Point.	51	1350 S. B. & M.	5.125
300 Confidence.	35	250 Sierra Nevada.	4.40
330 Con. Imperial.	72	300 Silver Hill.	850
370 Exchequer.	1.70	510 Union Con.	4.00
100 Gould & Curry.	4.50	450 Utah.	1.85
100 Grand Prize.	2.45	1000 Yellow Jacket.	775

### "On Milling Ores."

The Stiles quartz-mills and concentrators are now on the market. Special terms are offered for introduction. The hand-mill, which will reduce one ton in 24 hours by hand-power, is a model of the larger mills and is a true ore granulator. The five-ton mill can be run with one-horse power. The 10, 20, and 30 ton mills, with proportionate power. The hand-mill weighs only 450 pounds, and the 10-ton mill but 1000 pounds. The prices range from \$250 to \$900. Concentrators at the same prices. Send for circulars. Address J. A. Johnson, general agent, 307 Montgomery St., S. F., Cal., Nevada Bank building.

PREJUDICE rules the opinions of most men. One in a thousand dares to do his own thinking. The Stiles quartz machinery appeals to the thinker. J. A. Johnson, 307 Montgomery street, is the general agent.

### Don't Fail to Write.

Should this paper be received by any subscriber who does not want it, or beyond the time he intends to pay for it, let him not fail to write us direct to stop it. A postal card (costing one cent only) will suffice. We will not knowingly send the paper to anyone who does not wish it, but if it is continued, through the failure of the subscriber to notify us to discontinue it, or some irresponsible party requested to stop it, we shall positively demand payment for the time it is sent. LOOK CAREFULLY AT THE LABEL ON YOUR PAPER.

"ON MILLING ORES."—Address J. A. Johnson, 307 Montgomery street, San Francisco.

### ASSESSMENT NOTICE.

Butte Creek Hydraulic Mining Company.  
Location of principal place of business, San Francisco, California. Location of Works, Butte county, Cal.  
NOTICE is hereby given, that at a meeting of the Board of Directors, held on the 27th day of March, 1888, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary at the office of the company, No. 213 Market street, San Francisco, Cal. Any stock upon which this assessment had remain unpaid on the 7th day of May, 1888, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on Monday, the 25th day of May, 1888, to pay the delinquent assessment, together with costs of advertising and expenses of sale. By order of the Board of Directors.  
LOUIS A. LEVY, Secretary.  
OFFICE—No. 213 Market street, San Francisco, Cal.

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WORKS: First and Stevenson Sts., SAN FRANCISCO, CAL.

### CENTRIFUGAL PUMPS FOR

### IRRIGATION AND RECLAMATION.

TEAM ENGINES AND BOILERS of all kinds,  
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ELEVATORS for freight and passenger use, both worm gear and patent double capacity hydraulic.

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Are you going to make any change in machinery? Do you want Pulleys on Shafting already up? If so, don't fail to look into the merits of

### THE DODGE PATENT INDEPENDENCE WOOD SEPARABLE OR SPLIT PULLEYS.

They are the Lightest, Strongest, Best Balanced and

Most Convenient Pulleys Made in the World.

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Warranted the Best and Cheapest on the market. Can furnish kit complete or any part of it, leaving out articles parties may have or do not want. Can furnish larger Forges with lever if desired. Also the

### GRINDING MILL "The BEST MILL on EARTH."

Send for Catalogue.

Farmer's Forge, No. 5 B. Will heat 1 1/2 inch iron.

Farrier's Placers, Cast Steel, 12 inch.

Adz Eye Shoeing Hammer and Handle, Weight, 9 oz.

Farrier's Knife, Woosterholm.

Screw Plate, 3 Taps, 3 Set Dies, Cut 5/8, 3/4 and 1 inch.

Blacksmith's Hammer and Vise, Hardened Face, Fine Polish.

Blacksmith's Tongs, Wrought Iron, 18 inch.

Blacksmith's Cold Chisel, 1 1/2 lbs. Steel.

Blacksmith's Drill Press, 50 lbs.

Blacksmith's Hand Feed, 14 lbs. Steel.

### THE FOOS MFG. CO., Springfield, Ohio.



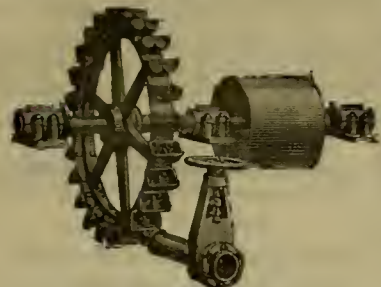
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Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3.00 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

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From 12 to 20 per cent better results guaranteed than can be produced from any other wheel in the country. It is not only most economical of water, but the most simple and reliable power for Quartz Mills, Hoisting, Pumping, or any other purpose where water power can be used.

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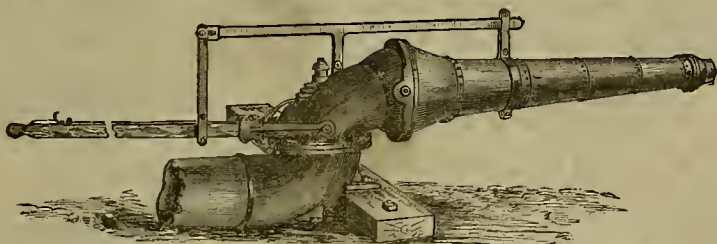
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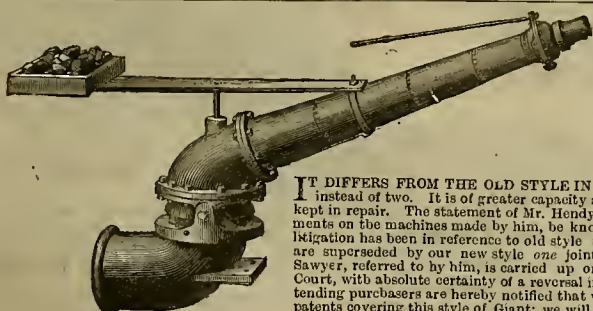


The above cut illustrates the IMPROVED FORM OF DOUBLE-JOINTED HYDRAULIC GIANTS, with lever attachment, which we manufacture. All similar styles are infringements upon this form, and a judgment stands of record to that effect, under a decision of Sawyer, Judge of the U. S. Circuit Court, in the case of Hendy and Fisher vs. R. Hoskin & Co.

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HYDRAULIC  
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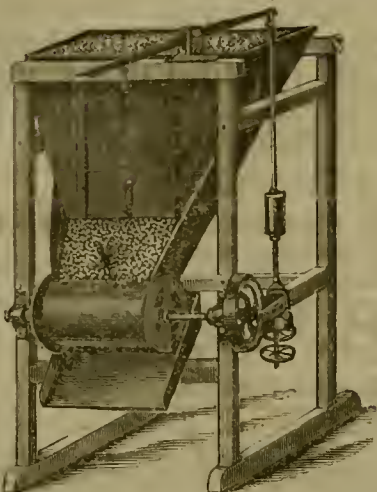
IT DIFFERS FROM THE OLD STYLE IN HAVING ONLY ONE JOINT instead of two. It is of greater capacity and more easily worked and kept in repair. The statement of Mr. Hendy that all styles are infringements on the machines made by him, he knows to be utterly false. All litigation has been in reference to old style two jointed machines, which are superseded by our new style one jointed. The decision of Judge Sawyer, referred to by him, is carried up on appeal to U. S. Supreme Court, with absolute certainty of a reversal in our favor. Miners and intending purchasers are hereby notified that we are the sole owners of the patents covering this style of Giant; we will prosecute to the fullest extent of the law manufacturers or users of an infringement.

HOSKIN & CO., Marysville, Cal.

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This is the best and cheapest Ore Feeder now in use. It has fewer parts, requires less power, is simpler in adjustment than any other. Feeds coarse ore or soft clay alike uniformly, under men or all the stamps in a battery as required.

In the Bunker Hill Mill it has run continuously for two years, never having been out of order or costing a dollar for repairs.

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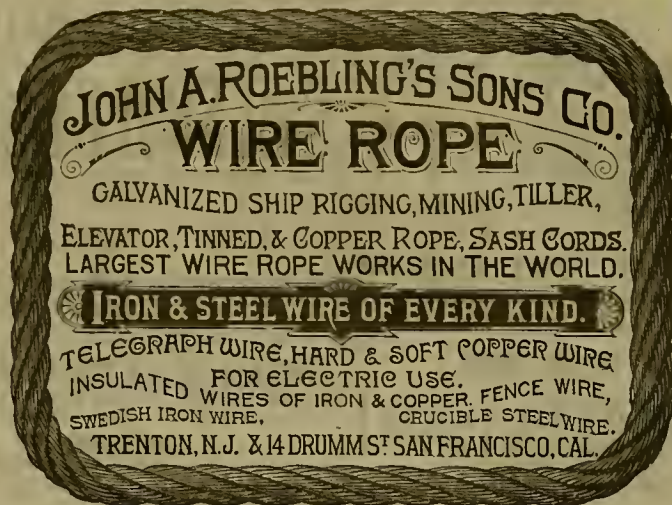
Twenty years experience, in California, purchasing Ores and dealing in Mines.

Special attention given to management and sales of mines and purchase and shipment of copper produce.

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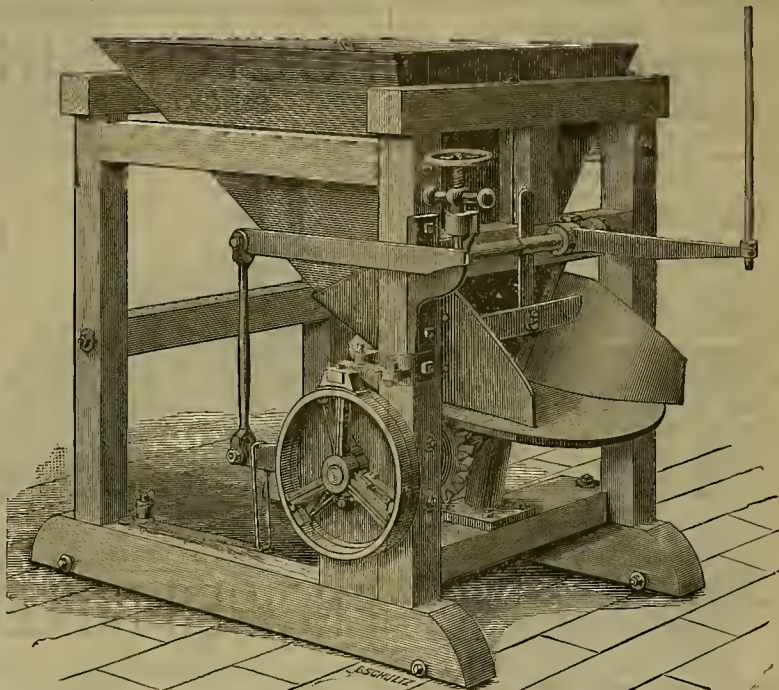
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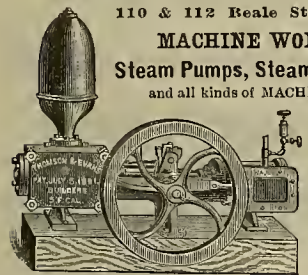
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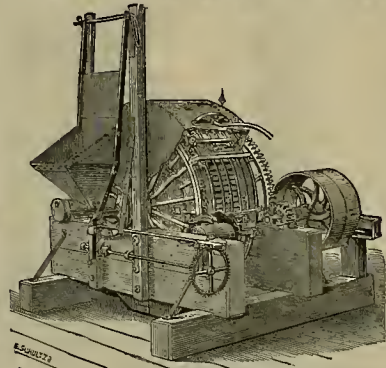
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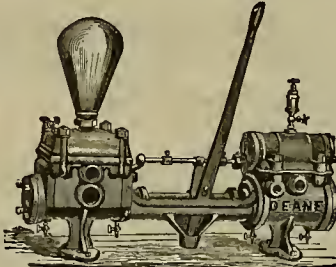
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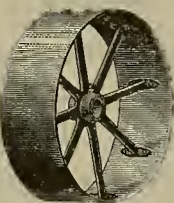
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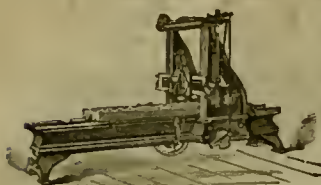
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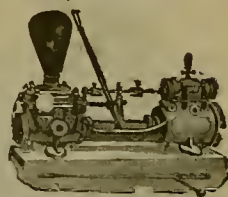


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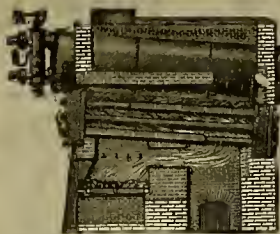
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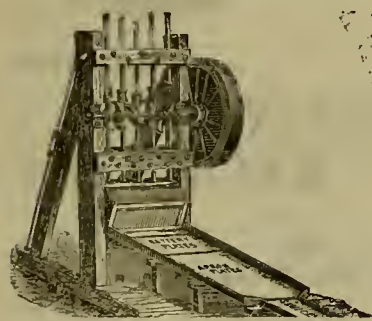
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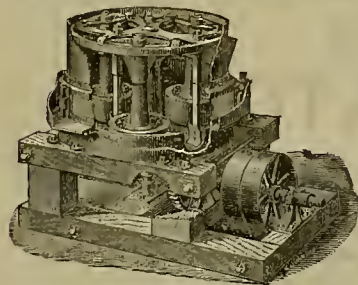
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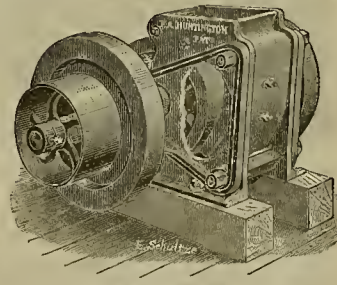


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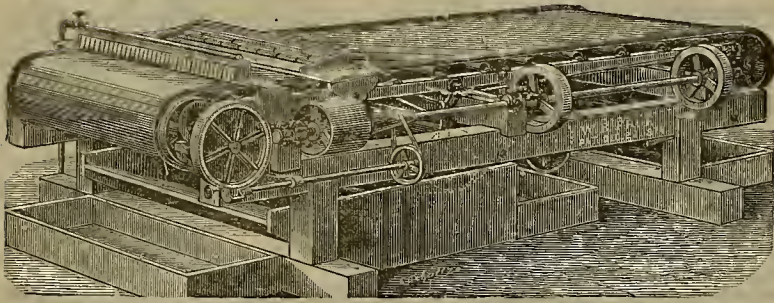
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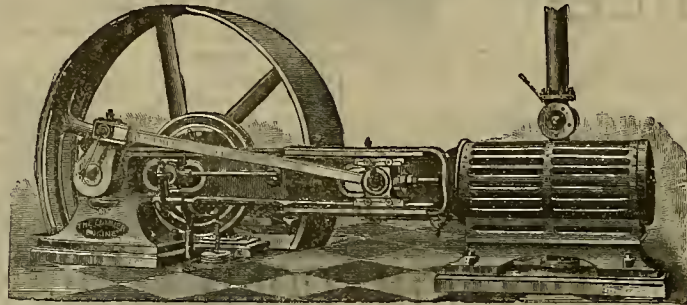
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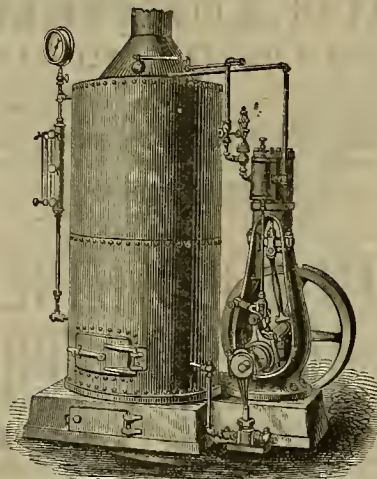
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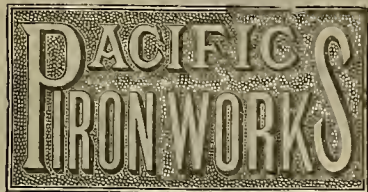
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Harmony Borax Mining Company, Alameda	1 75 H. P.	Oakland Gas Light Co., Oakland	1 200 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
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SAN FRANCISCO, SATURDAY, APRIL 28, 1888.

VOLUME LV.  
Number 17.

## Calvin Brown.

### Record of an Eminent Engineer.

Calvin Brown, whose portrait is given on this page, is an engineer of very large and varied experience. He is well known on this coast, where he has followed his profession for many years. Mr. Brown was born at Roxbury, Mass., in 1816, and was educated at the Roxbury Grammar school. His engineering instinct was manifested when a schoolboy, in the utilization of a small stream of water running through his father's premises for miniature water-wheels, trip-hammers, spinning machinery, etc. On this little stream he built the first of the many dams he has constructed.

When nearly 18 years old, he entered the engineering and patent office of R. H. Eddy of Boston, where he remained three years. Here he was employed on surveys for supplying that city with water, in the land surveys for the purchase of the site for the City of Manchester, N. H., and the location of the canals for the proposed factories of that place. At the age of 21, he was selected for the engineer of the Manchester Corporation, but declined the position, considering himself wanting in necessary experience. During the whole time of his service with Mr. Eddy, he was constantly employed and had charge of the location of the streets, docks and city lots of East Boston.

After leaving Mr. Eddy, he engaged in the engineering office of James Hayward, Esq., formerly Professor of Mathematics at Harvard University. While here and with S. M. Felton, C. E., he had charge of the hydraulic surveys and experiments required for the determination of the great lawsuit between the Boston Water-Power Co. and the Boston Iron Co. This service occupied many months and was performed under a commission of scientific and legal men, consisting of Mr. Hayward, Col. Leammi Baldwin, an eminent civil engineer who constructed the first granite drydocks in America, and Leverett Saltonstall, a distinguished lawyer. In this work, Mr. Brown enjoyed and improved a rare practical opportunity for the investigation of hydraulics. Upon the termination of this commission, he entered upon the practice of railroad surveys, location and construction, his first extensive experience of this kind being in the Southern States.

After this he was employed in ocean hydrography and surveys for the location and construction of lighthouses and beacons, under the direction of Capt. Alexander Parris, architect and civil engineer. It was under this gentleman, who at the time had charge of the engineering works at the Boston and Portsmouth, N. H., navy-yards, that Mr. Brown was employed as his assistant at the latter station, the especial occasion being the rebuilding of a large, deep-water granite wharf, which had been overthrown in consequence of faulty construction. He remained, however, but a short time in this subordinate position. Capt. Parris, after his completion of a new design for the remedy of the original wharf's destruction and the establishment of a system for the execution of the work, left Mr. Brown in charge, who then, at the age of 24 years, was appointed chief engineer of all his professional works at this station, which position he filled five years.

In this interim of time he constructed a line of solid masonry quay wall of about 1000 linear feet, much of which was in water of over 40

feet in depth, and upon a foundation of sloping rock, requiring frequent blasting for the footing of the outer courses of the stone work. This was the first occasion in the United States for the application of electricity or galvanism for blasting under water, and for the use of the diving bell for laying regular coursed masonry upon a large scale in such deep water.

Resigning from the naval service in 1845,

south of Dover street of that city. This firm of Brown & Hastings was employed by the U. S. Government in the machinery designs for the Memphis ropewalk, and in various other works in the naval service, as well as in several large private establishments, railroads, etc. Among the assistants employed by the partners was M. Carpenter, who subsequently became a distinguished U. S. Senator, and Zerah Colburn,

foundation the reverse of that upon which the Portsmouth wall was built. The difficulty of this problem, in order that its solution might be effected with the utmost economy, called for a somewhat peculiar design both in form of structure and execution, and Mr. Brown asked for a commission of engineers which should consider and judge of its merits. It was approved and the work commenced, and for nearly nine years continued under his direction. Other large works, such as the erection of a national foundry, boiler-shop, ordnance establishment, etc., at this yard were also in this interim designed and erected by him.

In 1861 Mr. Brown was detached from the Norfolk Yard and ordered to that at Mare Island in this State, where he has remained ever since. Besides his service on Government works, he has been extensively engaged in more private enterprises, both in railroad and canal surveys, and in the construction of water works. He built the first large dam for the Spring Valley Company, and designed and located the ship canal and locks at the Willamette Falls in Oregon. For several years he was one of the Government commissioners for the inspection of the Pacific railroad, and wrote the final report upon which the California system as then constructed was accepted. He is now retired from the naval service, and is engaged in several private corporation enterprises as consulting engineer, for which his large experience makes him competent.

**GOVERNOR WATERMAN'S MINE.**—Judge Sawyer has made a final decree in accordance with an opinion previously rendered, awarding nearly one-third of the celebrated Waterman mine to Ahhie L. Waterman, together with a proportion of the profits. The plaintiff is the widow of Governor Waterman's brother, and the suit was brought to enforce an agreement to convey an interest in the mine in consideration of money advanced to develop it.

**DURING** the month of March there was worked at the Nevada mill, for account of the Potosi Mining Co., 1550 tons of ore, yielding hullion of the gross value of \$33,242.91. The cost of reduction was \$10,850, and the net proceeds in hullion amounted to \$22,392.91. The assay value of the ore per ton was \$23.86. The gross average yield in hullion per ton was \$21.45, and the net average per ton was \$14.45.

**EUREKA AND RICHMOND.**—The long-pending suit between the Richmond Mining Co. and the Eureka Con. Mining Co., growing out of the alleged infringement of the first-named company's patents for working speiss, has been compromised and settled. By the settlement the Eureka Con. Co. has acquired a full and complete license to use the patents.

**THE MONTANA Co.** find that by the introduction of Frue vanners in their 10 and 50 stamp mills for the concentration of pulp before pan amalgamation they gain important advantages. By their means concentrates amounting to \$387,314 were recovered in one year which would otherwise have been mostly lost in the tailings. The vanners cost \$16,150.

**WM. IRELAN, JR.,** State Mineralogist, C. H. Aaron and W. A. Goodysar, all of the State Mining Bureau, have gone to the southern part of the State. They will commence field work in San Diego county.



CALVIN BROWN.

Mr. Brown re-entered upon railroad work, which he followed some years, afterward becoming engaged upon designs for turbine water-wheels, and upon their tests of efficiency in the factories at Lowell, Mass. Being now established in an office of his own in copartnership with Chas. Hastings, a former assistant of his, and with a corps of draughtsmen and fieldsmen, he became concerned in general engineering works, having personal charge of the construction of masonry piers, docks, and filling in of a large tract of the South bay for the City of Boston, and also of the grading of the streets

a Yankee boy, who afterward succeeded to the principal editorship of *Engineering*, a prominent London publication.

In 1850 Mr. Brown was called to the building of a railroad in a distant State, and thus left Boston. Completing his engagement with the R. R. Co., he was reappointed in the naval service to take charge of the engineering works at the Norfolk Navy Yard. Here he was called upon to renew his submarine experience at Portsmouth, N. H., in the construction of a line of heavy masonry quay wall, requiring to be erected upon a deep substratum of mud, a



## CORRESPONDENCE.

We admit, unadvised, opinions of correspondents.—Eds.

## A Reply From Mr. Patton.

EDITORS PRESS:—In a late number of your valuable paper I find the inclosed slip, which, as it contains several mistakes and misrepresentations, I return to you for correction, knowing your desire to publish the truth in such matters, and that you would not knowingly do me an injustice. In the first place, I have ordered no machinery from England. One set of ore-dressing machinery (a duplicate of that used at the Lake Superior mines for dressing copper ore) was ordered from Messrs. Fraser & Chalmers of Chicago as a pattern, they having built that at Lake Superior. The iron works in Australia are able to do all the work required, provided they are furnished with the necessary plans of same. As an employee of a colonial mining company I could not, in justice to them, import machinery that they can manufacture themselves.

As a matter of information to San Francisco foundries, I will state that the iron works here are furnishing castings for £9 (\$45) per ton of 2240 pounds, and finished work at the rate of £19 per long ton for cast and £22 for wrought-iron work. That portion of the communication relating to my reputation as an engineer is hardly worthy of notice. Those who know me best have blamed me for not claiming more credit than I have received for my work. As the machinery spoken of was designed and erected from 8 to 12 years ago, it would appear singular to an unbiased mind that the fact of my not being the author of my own work has just been discovered, and significant that this discovery was made immediately after my departure for the Antipodes. With many apologies for troubling you in this matter, I remain,

Yours truly,

W. H. PATTON

Broken Hill Proprietary Co., Broken Hill, N. S. W.

[The article referred to by Mr. Patton was published in the PRESS of Jan. 28, 1888, page 52, under the heading of "California Mining Machinery." It referred to the published statements of English officials having recommended American mining machinery, and to Mr. Patton (recently from Nevada) having recommended the purchase of English concentrating machinery for Australia. Some remarks were also made to the effect that the credit of designing some of the Comstock machinery was due to others as well as Mr. Patton, although his name alone had been connected with it. It was really a little "grumble" at Mr. Patton for not ordering machinery from San Francisco instead of getting it in England, when he knew how skillful our mechanics are in this line. It seems, however, that the article was based on false premises, as from what Mr. Patton says, it is evident he had not ordered any machinery from England, as the newspapers in Australia led people to suppose.—Eds. PRESS.]

## Gloster, Montana.

EDITORS PRESS:—This mine, that has so long been a steady worker, was compelled to close down their plant the first of the year, and they are now at work with a small force sinking, as their upper levels are exhausted.

From appearances they must have neglected their opportunities for purchasing neighboring properties, as they have worked up to their line on end next to the Diegan, an extension of the Gloster, and now cannot make terms with the owners. Hereafter has it that they could have purchased this property at a very low figure at one time, but would not have it at any price. Now \$150,000 is asked for it, which they claim is more than it is worth. Just now they have their 60-stamp plant lying idle in consequence of not being able to supply it with ore. If the ledge is worth anything now it surely would have been policy to have purchased it when offered at a low figure. H.

## The Jay Gould District.

EDITORS PRESS:—This name alone is a synonym of money, and the district thus named lies 20 miles northwest of Marysville, M. T., and this mine is now the only producer in the camp. It is a gold lead and pretty high grade, as they only have a 10 stamp mill on it and have been producing during the past few months from \$30,000 to \$40,000 per month. They have already paid over \$111,000 in dividends to their stockholders. There is none of this stock on the market, the owners being satisfied that they have a good thing with dividends regularly paid.

There are a number of other prospects in the same vicinity. The West Jay Gould is a stock company and managed by D. M. Sutton, who is quite sanguine that he has an extension of the original. If so, it is good enough for any one who follows mining.

The Homestake mine was not far distant, and

this mine paid large dividends for a year or two, but at present is closed down, for what reason I was not able to learn.

There is another fine prospect in this same district, the Alpha and Omega, that from the best information at hand will make itself heard from ere another year rolls around.

The ledges here are all gold-bearing, and in consequence a class of property that just now is much sought for, as there is no fluctuation in the value of a gold bar.

The Montana Central tunnel will be, when completed, 6300 feet in length. In its course it has already crossed on four-foot ledge of ore of fair grade that will pay to work. They expect to finish it by the 1st of October, 1888, but will probably lay a switch-back overhead and open their road by the 1st of June to Butte. This is something the Butte merchants and millmen have been devoutly wishing, in hopes that it will free them from the thralldom of a railroad pool on rates.

H.

## A School of Mining.

## California Boys Proving their Ability.

The number of young people in Grass Valley, California, approximating the age of 21 reaches the enormous number of about 1000 souls. Fully one-half of these are of the male sex, and nearly all of them were born and raised in Nevada county. This town has no considerable manufactories or businesses, except that of store-keeping and mining. For years and years the old prejudice prevailed unquestioned, that being American born, few if any of these boys could or would become first-class quar'z miners, and no general opportunity was allowed them to acquire the occupation that so many of their parents toiled at. When the mine-owners wanted men, they often sent to Europe for them, or else elected men of foreign birth at hand. It was regarded as a fixed fact that Grass Valley young men could not become miners. The most prominent mine-owners and the mine-owners favored the ridiculous prejudice to such an extent that there seemed to be no avenue for employment in the mines for the active young men of that town. It was held that to handle a pick or turn a drill or use a hammer, right and left, single-handed and properly, the workman must have spent his infancy and boyhood in the mines. The British idea that it takes at least seven years' apprenticeship to learn any trade ruled the roost, and as there was no such apprenticeship in Grass Valley there could not possibly be any miners among her native sons.

The result of this monstrous state of affairs has led most of the fathers in that city to exclaim, "What on earth is to become of our boys?" Many of them thought seriously of sending their boys to Europe, so that after awhile they might return and be "recognized" as miners.

Within the past two years a wonderful change has come over Grass Valley in the above respect. It is no longer admitted as above dispute that natives of Grass Valley, or of any other part of America, cannot become as good miners as any in the world, or that it requires a long apprenticeship to turn a drill, light a fuse or strike a pick successfully. On the contrary, it has been demonstrated that with the natural deftness of all American-born people, these young men can, in about as many months as it was formerly supposed to require years, master the details of quartz mining and become workmen equal in every respect to the best miners from Hungary or Cornwall.

"Yes, sir," said a well-known mining boss (himself a naturalized citizen) the other day, "we thought we would experiment with our home raw material, and the success that has followed has simply astonished ourselves. After six months' work in our mines we find that the majority of our boys can go anywhere and earn the \$3 or \$4 a day that is paid to competent miners. We hear from many of them afterward, from the mines on the Comstock, Montana, Colorado, Arizona and localities in this State, and they seem all able to hold their own with the best workmen when no favor is shown and no prejudice exists."

Of course these young men are, besides being industrious, fairly educated, some of them high-school graduates. It is not too much to expect that they themselves will in time become the foremen or superintendents or owners of the gold mines of California. Nothing could be more appropriate than that an industry such as quartz mining, which will forever be as permanent as that of farming, should in this State be operated, top and bottom, by natives of this State. None surely have a better right.

It is due to the Empire Company, at Grass Valley, to state that they were the first to practically thus demonstrate that California young men have in them the material for as good miners as any in the world. This fact of itself has caused the managers of this mine to become exceedingly popular with the "boys." Other mines are slowly following the example. A prejudice as deeply rooted as that which so long excluded them from this pursuit cannot be overthrown in a day; but it is bound to be entirely exterminated sooner or later. Of all pursuits, quartz mining is the one that can only be acquired by actual experience, and a well-conducted quartz mine must forever remain, after all, the only real "School of Mining" in the world.—Nevada Transcript.

## A Prospector's Address to the Rocky Mountains.

[Written for the Press.]

O mighty range of peaks and glens!  
Thy native muse inspires my pen;  
I lay to rest the pick and pan  
That I thy gorgeous scenes may scan.  
The hidden vaults of glittering ore  
That thou hast stood as sentinel o'er,  
Since earth from out of chaos came,  
Is not the spark that lights my flame;  
The graodeur that mine eyes behold  
Is more than all thy wealth of gold.  
Though future generations may  
Reveal thy trust to light of day,  
And pierce thy heart for Mammon's pride,  
Thy greater glories shall abide  
With thee for aye, and none shall dare  
Despoil thy contour high in air.  
They cannot rob thee of the spell  
That in thy towering crowns doth dwell,  
Nor mar th' enrapturing scenes displayed  
In placid pond or grassy glade,  
Environed by thy cliffs and crags,  
Where longing, loving memory lags.  
No hard that once beheld thy grace  
Could stand unawed before thy face.  
The verdant vales below thee lie,  
Thy snowy crowns doth pierce the sky;  
Ere morning's sun has kissed the plain,  
Thy crests present a golden chain,  
The forests wild that gird thy sides,  
The bounding game that in them hides,  
The crystal waters laughing near—  
All tend thy lover's heart to cheer.  
When threatening clouds are hovering low,  
Thy head above thy foot below.  
The pealing thunders, lightning's flame,  
May spend their force on thee in vain.  
As some proud soul in human form,  
Whose breast is hard to every storm  
Of life, the sun's effulgent beam  
Still shines above the mists serene.  
When time was young, the earthquake's shock  
That made thy very bosom rock,  
And rent the granite fields in twain,  
Exalted thee above the plane  
And made thee all that thou hast been—  
An artist's love! a poet's theme!  
So may the spirit racked with care  
Become at last more sweet and fair—  
Too pure to be by pen portrayed,  
Too high to be on canvas laid,  
O proud and peaceful monarchs, stand!  
Emblem of life to mortal man!  
To you a lesson each may read,  
That have and earnest men succeed;  
Though tempests rave, there are heights sublime  
Where scintillant suns shall ever shine.

Glendale, M. T.

HENRY W. BROWN.

## Eastern Washington.

\* A letter from Spokane Falls to the *Boite Inter-Mountain* says: Mining men are constantly leaving Spokane for the different sections where their interests lie, and they in turn are being supplanted by new arrivals bent upon an exploring expedition into some one of the contiguous regions. Thomas Lowthion, the well-known Denver expert, came in a few days since and has left for the Okanogan section, where he purchased some valuable interests last season. He has unlimited faith in the future of that section and owns some of the most promising prospects in the camp. Ex-Governor Charles E. Loughton of Nevada, now residing at Tacoma, and manager of the Salmon River Mill and Mining Co., recently organized in Tacoma, stopped over Sunday in Spokane on his way to the mines. The machinery for the new concentrator erected by this company was shipped to-day for the mines and will be erected at an early date. Mr. Loughton feels very much elated over the prospects of that section and says that the developments the present season will astonish the world. From Mr. R. R. Hargrave, who has just returned from the camp, it is learned that two or three very important sales have taken place recently, one of them being the La Brea. The development work on the La Brea is about as extensive as any other claim in the entire camp, and the purchase is considered a bargain. Late advice from the Kootenai district say that a stampede is being made to that section, but that the snow is too deep for any prospecting to be accomplished of any consequence, and the miners are advised by those already arrived to stay out for some four or six weeks yet. The snow is seven or eight feet deep on the mountains, and prospecting is impossible outside of the valleys. The developments on the properties being opened up are showing fine returns, and the mines look as promising as ever.

GREAT FALLS REDUCTION WORKS.—If Great Falls carries out what is proposed in the way of mammoth smelting and general reduction works for handling the great ore beds of Montana, she will surely become at home what the distant Swansea of Wales is to the world at large under the present regime. But this prestige may soon be diverted from Northern to Central Montana. It is authoritatively announced within the past week that the great Northern Pacific combination, with S. T. Hanser at its head, will proceed at once to build anything yet constructed or contemplated for ore-reduction purposes in the world. The location of these great works has doubtless been determined upon, but not made public. We think it rests between three points—the Prickly Pear basin on one side of us, Livingston on the other, and Bedford, situated on the ever-flowing warm springs across the river from Townsend. Bedford has all the natural advantages required, having not only the requisite amount of never-failing water and water-power,

convenient extensive dumpage grounds, but is as centrally located upon the N. P. railroad as any other point suggested. The outlook is favorable for Valley county possessing in the near future the Swansea of the world.—Townsend *Tramant*.

GYPSUM.—The *Stockton Independent* says: Stockton is to have another large manufactory, to be operated by the Pacific Gypsum and Fertilizer Co. The company has been organized in this city with L. U. Shippee as President; Edwin F. Smith of Sacramento, Secretary and Business Manager; W. G. Scott of Nevada, General Superintendent. Col. J. B. Wright of Sacramento is a heavy stockholder, and a number of Stockton capitalists are largely interested in the enterprise. The capital stock of the corporation is \$1,000,000, and the principal place of business will be in this city. The purpose of the company is to mine, manufacture, and deal in gypsum and other material for the fertilization and improvement of soils; to carry on traffic in plaster, cement, tile and stone, and to engage in the purchase, reclamation and sales of lands. The company's mines are located in Humboldt county, Nev., and millions of tons of the purest variety of gypsum are exposed to view within a few miles of the main Central Pacific railroad. It is the intention to bring the mineral to Stockton in bulk and mill it here, making this the market for the coast. An average sample analysis of the commercial article from these mines, made by Prof. Hilgard of the State University of California, returned less than one per cent of foreign matter, showing over 99 per cent of pure gypsum or sulfate of lime.

BACK FROM KOOTENAI.—Ed Bolger, who has been visiting the Kootenai country in the British possessions, returned after an absence of three weeks. He says that little can be told at present of the future prospect of the camp he visited, but few people were there, not exceeding 40 at most; about 12 miners were at work, but the rest waiting for the snow to disappear. This will take fully two months, according to statements of parties that have resided there for some years. John and Jap King, Billy and Charley Chambers, Snyder, Tom McCloud, Ike Nail, McDougal, Bob Buchanan, all Coeur d'Alenars, are there, and John Ward, the well-known restaurant man, was at the month of Kootenai lake, about 70 miles south of the camp, on his way there with a restaurant outfit, accompanied by his partner, McDonald, Al Markie and two Indians in attendance. The only locations as yet open and showing mineral are the Silver King, Silver Queen, Bonanza, Iroquois, Grizzly, Toughnut and the Giveout. Mr. Bolger says he cannot advise any one to undertake a journey there at this time. The trip is a hard one and prospecting an impossibility with the snow in its present condition.—Wardner News.

THE SACRAMENTO RAILROAD SHOPS.—The Southern Pacific Company has broken ground and commenced erecting large extensions of their shops in Sacramento. There are now over 2100 men employed, but the capacity of the shop is very deficient for present demands, and the present enlargement will enable an increase of the force about one-half. The new additions will give about two acres area of floor room. The building will be constructed of framework and corrugated-iron covering. An extension of the boiler-shop will be 90x150 feet. The machine-shop will be extended 100x112 feet. The car-shop will be enlarged 90x92 feet, and the paint-shop 85x180 feet. A new car-shop will also be erected 75x150 feet, and an oil-house 50x100 feet. The ground is already broken for these buildings and others are contemplated. Electric lights are being put in to light the entire grounds around the shops, as well as the interior of the structure, so that night shifts can be worked as successfully as by daylight if necessary, and they probably will be. The enlargement of the shops is to be crowded forward as rapidly as possible.

REDUCTION WORKS.—It is now almost a certainty that reduction works are to be erected at Luning. Suitable facilities for the economical reduction of ore has been one of the greatest drawbacks to our several mining districts. Under present circumstances, our mine-owners are compelled to ship their ore to Selby or some other works at a distance to have it reduced, thereby making it necessary that the ore should be of a high grade to stand the additional expense of transportation. With suitable reduction works within the limits of our country, men who now have quantities of \$20 and \$30 ore on the dumps of their mines will be able to have it worked and receive a fair compensation for their labor. In this way they will be encouraged; and with the money they would receive from the low-grade ore now on the dumps they would be able to more fully develop their mines, and possibly in the course of a short time open up valuable properties. It is hoped that there will be no unnecessary delay in the construction of these works at Luning.—*Emeralda News*.

DURING the month of March there was worked at the mill, for account of the Potosi Mining Company, 1550 tons of ore, yielding hillion of the gross value of \$33,232.91. The cost of reduction was \$10,850, and the net proceeds in hillion amounted to \$22,382.91. The assay value of the ore per ton was \$23.86. The gross average yield in hillion per ton was \$21.45, and the net average per ton was \$14.45.



## A New Theory of Coal Formation.

Old age gives one a sort of right to be reminiscent. I hold that I am, by virtue of three-score years, entitled to that right. I want to enjoy it now.

I saw in the *Illustrated Pacific States*—this journal—what was copied from the reported transactions of the Geological Society of London where Mr. W. S. Gresley "adduced evidence against the theory that coal-seams were formed from vegetation growing on the spot." Now there is a question that I settled for my own mind, and the minds of a few others, as far back as the year A. D. 1847-8. I found and proved then that true coal (not lignite) is not formed from vegetation

### Grown on Any Spot.

True coals, whether bituminous or anthracite, are the product and residuum of ancient petroleum discharges from the interior earth into most ancient receptacles, lakes or pools; in which receptacles the oils had eons of years to evaporate and harden into what we now call coal—stone-coal. How the dynamic and static pressure mounted these oil receptacles with untold millions of tons weight is not for me to state; but of one thing I am certain, that, like the renowned bedbug of modern song and story, they "got there all the same." How, then, do I account for the impression of various plants, leaves, woods and roots in the coal-seams, or beds? That is just what I am going to be reminiscent about.

Here goes. My respected and lamented father was a contractor and builder, in the city of Wheeling, Virginia (now West Virginia), in the summer season, and a coal-mining merchant in the winter season, and he had four boys, of whom I was the youngest. We boys all had to work—not only to work but to work at whatever he put us to doing. He was a Scotchman, though perhaps about five-hundred ngo, as his name indicates, his remote ancestors might have been of Gallic origin, but, at all events, he had all the sternness, integrity and unflinching grit of the old hard-headed (not very soft-hearted) Scotch Christian.

He was, as are most of his kind, a little cranked on the subject of "a good education," and with him "a good education" meant to be able to "cast up accounts quickly and void of errors," to "write a good plain round hand," to be able to "draw a fair contract according to law," to "read the Bible intelligibly" and to "lead in family worship." Still, while these were his general fixed and permanent ideas of good education, he was not really averse, where parents could well afford the expense, to a higher, academic or collegiate education; provided, always, that the curriculum, as he called it, should be of a solid and serious nature.

There were no such places as houses of public schools, or common schools, in my early days where I was born and reared. We had the school by "the quarter"—three months at a time—and paid cash for tuition, books, house-rent and fuel; so we did not go to school very much. But, after awhile, from the proceeds of the estate of a good, dead, rich man we got an academy. I was sent to it. The teacher, Captain Gray, formerly of the British Army, and pupil if not graduate of Glasgow University, Scotland, was a tall Scotchman.

In those days books were scarce and costly—not plenty and cheap as they are now—and I never had seen or heard of such words as

### Geology or "Mineralogy."

But I had been brought up among claybanks, limekilns, limestone quarries, freestone quarries, coal mines, iron ores, smelters and foundries; therefore to a degree I was a geologist and mineralogist without knowing it. I was astonished when Captain Gray—I think his name was Gray—on one Friday evening, just as he was about to "let us out," stated that if ten or more boys would come to his boarding-house next day, Saturday, at 10 o'clock A. M., he would form a free class for the occasional study of geology and mineralogy.

So on Saturday, instead of sorting the slate and sulphur stones—pyrites of iron nodules—out of the pile, or dump, of waste, or dirty coals at father's mine, I went to study geology. But I was half disappointed when Prof. John Gray, of the University of Glasgow, led us boys

### Right Straight to the Coal Pile

Where I had worked every Saturday all winter. Still, right there he delivered a very fair sort of a short lecture on the formation of coals—stone coals.

The coal veins of West Virginia, Eastern Ohio and Western Pennsylvania, along both sides of the Ohio river, are (as far as then developed) in the big hills where they lie almost horizontal; only somewhat dish-shaped where the hill is highest and heaviest—that is to say, the coal vein is most sunken under the bodies of most weight. In the river-hills these veins are from 4 to 5 feet thick and the coal is of the bituminous—or fat coal—variety, and burns with a heavy smoke and lambent flame.

But the vein is not all good coal. There is "top coal," which is the purest coal, and it occupies about two-thirds or less of the vein from the top downward to where it strikes a body of impurity of three to six inches in thickness; and below that, to the floor, is the bottom coal. This vein of impurity running through the coal body contains some good coal mixed with thin layers of sandy black slate and kidney-shaped nodules of iron pyrites, commonly called "sulphur stones," "copper balls," etc. These nodules, when placed upon the fire-grate, and heated hot, explode and

Throw Their Pieces into the Family Circle To the great disgust of the housekeeper. Hence you can see that coals thus afflicted were

better to be dumped to one side and assorted so that the coals could go to market, the iron pyrites to the chemical works for copperas, and the slate could go—well, could go to thunder. This sorting was my business on Saturdays.

Now, of course, being an observant youth, I noted some features in my work, and thus, long before I had met Prof. John Gray of Glasgow University, Scotland, I had asked myself: Why is it that the whole body of the top coal is a solid mass like jet-black rosin while the slate vein and the bottom coal are laminated; and why is it that at the sandiest part of the slate vein I find the most fossil prints of vegetation, such as fern leaves and the like, while in the solid top coal I never—or very seldom—find anything but pure coal? I could not resist the impression that, in some way, the top coal must have been made later than the slate vein or the bottom coal; but how that could be done I had no idea.

But now comes Prof. Gray to the coal pile and tells us that this coal vein was once—thousands of years ago—

### A Vast Mass of Vegetation.

And to prove which he picked up, out of my own collection, several specimens of the imprints of fossil plants. Then he explained how those old-time plants, falling for untold ages around the great steaming lagoons, were drifted into vast bodies and covered by great weight, for ages and ages again, until they became fossilized, bituminized carbon for the future use of man and the glory of God.

When the class in geology adjourned I walked homeward along with and her youth of about my own age, and as we walked along I exclaimed:

"I do not believe that!"  
"Don't believe what?"  
"Why, that stone coal is petrified vegetation. It can't be."

"What is it, then?"  
"Well, that's what I don't know." (Petroleum was not then known in large quantity.)  
"Well, then, you ought not to contradict them as do know."

"Oh yes. Galileo could contradict the civilized world before he could explain it all." (I had heard about Galileo and Columbus.)

Just then we were overtaken by a pair of coal miners coming home from work. One of these miners was an Englishman and for several years of his life had been a sea-going sailor from Liverpool to Brazil. To this sailor-miner the other boy said, pointing to me:

"He says coal is not made out of wood and vegetables."  
"Wot do 'ee say 'tis made of, lad?"  
"Well," said I, "I don't know, but I'll tell you what I think."  
"Wot is it?"

"I think there must have been, as Prof. Gray says, great ponds, and I say some sort of stuff or lava-like track of a greasy nature

Bubbled up or Poured Out on these Ponds For awhile and then stopped—that made bottom coal. Then the water of the pond sloshed about over this bottom coal and carried slum and fine sand over it—that's the slate vein. Then the outpour of this stuff started again and flooded the ponds on top of the bottom coal and the slaty vein—and that is top coal. Of course some trees and vegetables could get washed into this stuff."

"Blast me bloody eyes, but I think you 'ave it, lad. It ever you go to the Hiland of Trinidad, in the West Indies, you'll see wot you're takin' about. There's a lake as they calls the Lake of Bitumen, and it's a good hour's walk around it, and it's nothin' but the world but some kind o' pitch as cometh out o' the ground—and it'll burn like tur."

Still, notwithstanding the partial confirmation of my theory by the miner-sailor, these were the words read by Capt. Gray from the works on Geology: "It is difficult to determine, however, in what manner (coal) has been formed, or by what operations the vegetable matter, from which it has originated, has been so far modified as to have assumed the properties under which it exists." (The italicizing is mine.)

The ordinary intelligent coal miner, while he did not dispute it directly, did not take very kindly to the

### Vegetable Origin of Coal;

So, when I found an educated German who translated to me from the "German Conversations-Lexicon" (of an edition dated prior to A. D. 1829) an account of the bitumen lake and other bitumen deposits, I was able to make a few positive converts among coal-mining people to the idea that coal is not a product of petrified vegetables.

Along about 1848-9 I left off hard work for awhile, went to study something else, and lost sight of the coal business, and also of geology and mineralogy; but in A. D. 1860-61 came the "coal oil"—petroleum—excitement in Pennsylvania, West Virginia and Ohio. I fell into line with that energetic epoch, and while prospecting for petroleum I found the evaporated petroleum—or bitumen—in thin veins, pressed between the ancient laminated rocks, and, so far as I could see or find out, those thin veins were

### Identical in Form, Construction and Character

With the top-coal of the bituminous coal veins in West Virginia. Ever since then I don't go a cent on the theory of the vegetable origin of coal. To my mind the imprint of fossilized plants in coal is an accident somewhat resembling the accident of a long red human hair in a roll of country butter—which goes to prove that there may be a red-headed girl in the farmer's family but is no evidence as to which cow originated the basis of the butter.

Yet, after all, nevertheless and notwithstanding, if any philosopher, scientist or observer will prove that petroleum is a vegetable oil,

which I think cannot be done, then my theory is "a goner;" but I will not take fossil plants in coal as evidence of the vegetable origin of coal. The advocate of the vegetable coal origin must first reduce his vegetables to oil—and very old oil at that—before bringing his case into this court.—J. W. GALLY in *Illustrated Pacific States*.

## The Mines and Miners.

BY PEDRO CASTERA.

(Continued from our last.)

(Translated for the Press from *El Minero Mexicano* by M. N. M.)

### The Mine de la Cruz

Was one of the oldest, and possessed deep and extensive works. It was exploited by an English company which was making it clean and secure before commencing to extract the ore. The mine had two shafts separated by a distance of 300 varas, and of about the same depth. Through one of these they effected drainages by the ancient system of malacates (windlasses), and the other, the mouth of which was in the patio (yard) of the mine, served as entrance and outlet for the trajadores, or those who worked in the mine. It had besides a socavon (tunnel) 400 varas long that was abandoned because it was in danger of falling in.

In the large patio toward the interior of which the doors of the administration, forge, and other offices of the mine opened, two young men were walking arm-in-arm, their tracks marked upon the snow that covered the pavement. One was tall, robust, strong, of a pallid color, and with a sad, restless look. He was the chief miner, whose name was Leon. The other was ruddy, slender, short, with blue eyes, spacious forehead, and an agility that was noticeable in the least of his movements. His name was Henry, and he was a mining engineer, who had arrived the evening before, with the intention of practicing in order to obtain his professional title. They were intimate friends.

### "How Do You Like the Mine?"

Inquired Leon of his companion.  
"It is detestable!" he replied. "As it is the first that I have visited, it has given me a bad impression. I went down yesterday through the tiro of San Miguel, a deep, dark, pestilential shaft, by a rope ladder, filthy and slippery, to a work they call La Luz, but which is rather one of darkness. It is in a square canyon, four meters wide and more than two hundred long, the pavement full of mud and its sides and roof lined with great beams which resemble the spine of some monstrous animal. Twelve varas to the left runs another identical canyon parallel to this called La Preciosa. Both were hot, dark, miry, miasmatic and infested with rats. They were connected by diverse passages. Is this mine given over to the rats?"

"Only to clean it. Rats are the scavengers of mines."

"It is loathsome," said Henry. "As I rested my hand upon a beam to keep from falling, I felt something gliding between my fingers. At the capital I conceived the mines to be different."

"I can readily believe that. In Mexico a miner is somewhat fantastic in regard to events and acts. He likes to see them through a telescope."

"Better a microscope," replied Henry. "Everything is small, and therefore we should use this lens. The small and the great are relative ideas and the same is applicable to both."

### Everything in Creation is Admirable.

A cubic millimeter of matter contains eight sextillions of atoms, and the Via Lactea eighteen millions of stars. If we could spread out or expand a molecule, we would get a nebula, and compressing the latter, would obtain the former. The drop of dew, trembling in the chalice, which reproduces the rainbow, is composed of 100 parts of oxygen and 12 50 of hydrogen, the same as the water of the enormous tromba. The flowers change their pollen as the stars their light. The phosphores which burn in the glow-worm, likewise vivifies your brain. The little animals which swim in the pupils of your eyes consume the oxygen of the air in order to breathe and live, and who knows but that the burning comet, with its luminous tail, may not also respire in the ether? The smallest is often the most marvelous. Affinity is similar to gravitation, but to me it is far more admirable. Linnaeus and Newton show me that all things are relative and that only God is absolute."

"That is true," replied Henry. "Beyond the reach of every lens fixed on any point whatever, there is the infinite."

"Hence the grandeur of thinking," said Leon. "To think is to see; it is to expand the mind, to multiply life, and to augment our faculties. He who thinks struggles, because he meditates, incubates, labors; to superior thought, superior will. Plato by thinking saw America across the Centuriae in Atlantis. Wise men meditated upon that idea. Columbus incubated it, and hence the birth of a new world. What is greater than to think?"

"To feel," replied Henry. "For me, ideas are reflections of the sentiment. Nature is as much a work of art as a work of love. Two beings that gravitate like two stars. Humanity is an immense heart. I wish to feel, to suffer, and to enjoy it all, submerging myself in the tem-

pestuous sea of the passions. For me, to think is to doubt, while to feel is to believe, because it is to love. I would rather be Byron than Thales."

"Let us not discuss," said Leon. "There is nothing so beautiful as liberty, but there is also nothing so respectable as conscience. The sanction of right within is above all. For my part, I am disgusted with the life of a miner, which, though it includes study, has much more of action. I think of renouncing my employment and returning to the capital to prosecute my studies."

"Your studies, Leon! What more do you desire to learn? You know mathematics, mechanics, physics, chemistry, geology, zoology and botany, or what is the same, the exact and natural sciences. What more do you desire?"

"Every engineer ought to know that. I have studied philosophy, ethics, history and astronomy; but, like the Greek philosopher, I confess that I know nothing."

"What more do you wish to study?"  
"Everything—absolutely everything. I have an unlimited thirst for knowledge."

"Ah, Leon, some day you will

### Be an Old Man Like Faust.

And you will seek love as the golden key of life."

"That is true—I will grow old bending over my books, and like him, I shall some day have the universe beneath my brow."

"And in the meantime—how will you live here?"

"I will rise at five o'clock, go to the mine, oversee the work, leave it at ten and eat something, study the rest of the day, return at six o'clock to the mine, review the work, leave at 11; and the next day pursue a similar course."

"Pooh—that is a monotonous and disgusting life!"

Leon was about to reply, when at that moment a boy came running from the mine, and, seizing the cord of the bell-clapper, sounded the alarm of fire. Hardly had the bronze voice waves the cry for succor, when all those connected with the mine suffered an electrical shock. From all the houses of the Real, the patios of the mines, and the various haciendas, were seen issuing numerous groups of laborers, who were coming to the assistance of their companions. The church-bell began to ring and then there broke forth that song, so singularly sad, that, heard but once in a lifetime, is never forgotten—the Alabado.

Quemazon! Quemazon! screamed the pepenadores (workmen who assort ore) grouping themselves near the door of the shaft, which was beginning to throw out a column of smoke.

### The Mine is Burning!

Fire! fire! vociferated the operatives, running in all directions with tumultuous disorder. Sin novedad—sin novedad (no danger) said with firm voices the sentinels of the patio and the porters of the tiro, while the bell continued giving its note of alarm. The director, the administrator and other placemen, leaving their offices and their respective tasks, came out to the patio of the mine and were there joined by the two young men. Said Leon to Henry, who had turned somewhat pale: "I have here a variety of the life of a miner. Go and amuse yourself."

"What are they doing?" inquired the director of his second, the administrator.

"What are they doing?" inquired the latter of the chief miner.

"I have received no information," replied Leon.

"Nothing has been transmitted, senior director," said the administrator.

The director, when he heard that reply, crossed his arms and contemplated the disorder of the patio, which for some moments had been increasing.

"But this is absurd!" said Henry to his companion. "If the mine is burning, why not give assistance to those who are in it?"

"Because there is yet no notice."

"But what does that matter?"

"We are not permitted to interrupt the order of things. Come here, Tildio!" Leon exclaimed to the boy who was tolling the bell. The latter was a child about twelve years old—pale, thin, nervous, flexible, slightly developed, but strong and agile. He had an aquiline nose, fine lips, a dark skin and small black eyes, which were very lively and wonderfully expressive. His name was Juan, but he was nicknamed *el Tildio*.

### (To be Continued.)

A PIGEON IN A MINE.—Tuesday morning a pure white live pigeon was found nesting at the bottom of the shaft in the Andes mine, at a depth of 500 feet below the surface. The winged victor was easily captured by the miners who discovered it, and it was brought to the surface. After a long discussion as to whether it should be held in captivity or released, it was decided to liberate the prisoner. When set free the pigeon hovered about its captors for a moment, as if for the purpose of attracting their attention, and then suddenly darted due northwest with the speed of an arrow.—*Virginia Chronicle*.

A REVOLVING WRENCH.—A wrench recently patented in England consists of a circular head provided with jaws of different sizes. This head can be revolved on the handle, and held in the position desired by means of a bolt-head engaging with one of the jaws.



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SAN FRANCISCO

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## Passing Events.

The Comstock mines are now making a larger monthly bullion product than for any time in ten years past. Moreover, the yield is gradually increasing. Curiously enough, mining stocks are very low in price in the face of these facts.

Rain is quite badly needed in this State, and there is some uneasiness felt in certain sections over the lack of moisture.

The inauguration of a new railroad from San Diego to Cuyamaca in San Diego county will be a good thing for the Banner and Julian mining districts. Ground was broken this week.

Reports from the new Salmon mine on the Northwest coast are not very favorable. Still developments have not yet progressed sufficiently to prove the value of the mines.

The Southern California papers are filled with accounts of the gold found in Lower California. Coarse gold and nuggets are reported. The mines are on a grant which has been made to a company, and this company is prospecting the field. They will allow no dry-washers to be used, but permit miners to work with pick, shovel and pan. Only experienced miners with a good outfit can do anything. It is no place for poor men to go. If no land-owning companies were interested in the region there would be more confidence placed in the published statements.

## Why Our Cheap Natural Products are Neglected.

It is matter for surprise to those not familiar with the industrial conditions that obtain in California the limited extent to which we have utilized the useful minerals and metals here so abundant. A novel feature of the case, and one that would tend to further increase the wonderment of these strangers, were it brought home to their knowledge, consists in the fact that we are doing even less toward turning these subordinate forms of our natural wealth to practical account now than formerly. Of coal, lead and copper the output in California has been growing less and less for some time past. Our deposits of manganese, sulphur, and graphite operated for a season, mostly in an experimental way, have long since ceased to be worked. With our extensive beds of fire-clay, gypsum, marl and cement, little has ever been done or attempted. The only effort ever made here to manufacture iron, proving unprofitable, was abandoned several years since. We make some plaster of Paris, soda and salt, but not enough to keep out large importations. Mining for antimony and chromium struggles along, fluctuating a little, but without making any perceptible gains from year to year. The business of gathering magnesia, essayed for awhile in Livermore valley, died last year with the early flowers. We dig from our great masses of asphaltum enough of that mineral for home use, but no more. Of asbestos and mica we have plenty, but use very little, the production of quicksilver, borax and petroleum being in this department of our material resources the only active and important industries.

Now, the stranger within our gates looking about and seeing these useful substances so little drawn upon, or so wholly neglected, would be apt to set this down to our want of enterprise and thrift. And yet, were he to do so, he would arrive at a wrong conclusion. What to him would appear proof of had husbandry is in reality evidence of our sagacity and business sense. Paradoxical as it may seem, it is not because we are so shiftless, but because we are so prosperous, that these minor products of nature have been so overlooked and neglected. Having other and better paying pursuits to engage our time and means, these of secondary importance have been relegated to their proper place on the industrial calendar.

A quarter of a century ago, when gold mining in California seemed threatened with a fatal decadence, and before the agricultural capabilities of our soil and climate had been more than partially tested, many of our enterprising citizens, believing that the time had come for developing these deposits of the useful minerals and metals, set on foot a number of schemes directed to that end. Coal, copper and petroleum; tin, iron, antimony, plumbago, manganese and chrome; salt, marble, soda and cement; in short, nearly everything in the line of cheap commodities was duly looked after. Though much money was invested in these several enterprises, and the whole conducted with energy and care, the most of them proved in the end financial failures.

For these untoward results the originators and managers of these well-meant projects were not to blame. They acted from the best of motives and with what at the time seemed good judgment. But a new and a better industrial epoch was about to dawn on California. While this experimenting in new directions was in progress, gold mining in California began to revive, the discovery of silver in Washoe imparting meantime a great impetus to that branch of the business. Land culture in all its departments developed an astonishing and unlooked-for importance. Capital and wages, instead of declining, remained dear as ever, and the cheap labor on which these seekers after this new departure had mainly depended for success failed to materialize. In the fields and the mines, in the forests and the fisheries, on land and on sea, there was remunerative employment for all. The day of small things in California had evidently been postponed; and what, under the circumstances, could our adventurers in these new industrial fields do but retire?

From our past experience, so abounding with fruitless endeavor, the fact is evolved that cheap commodities cannot yet be profitably produced in California, nor yet anywhere on the Pacific Coast. With miners' wages ranging from \$2.50 to \$3.50 per day, we cannot af-

ford to get out manganese, graphite, manganese chromium, soda and like low-price substances which command abroad, where we have to find our principal market for them, only from \$15 to \$30 per ton. Mining these, beyond what is required for home use, can only be done at a loss unless the conditions be exceptionally favorable. We can hope to do but little with these products so long as mining for the precious metals and the cultivation of the soil warrant the payment of the present good wages.

## Quicksilver and the Tariff.

The quicksilver manufacturers of California have united in a memorial to Congress asking that, instead of admitting the article free of duty, a specific duty of from 20 to 25 cents per pound be imposed. The quicksilver interest in this State represents a capital of \$30,000,000, and gives permanent employment to more than 5000 men. Quicksilver is an absolute necessity in gold and silver mining. While the article was protected by a duty the business was fairly profitable, and some 30 mines were operated in this State, the only one in the Union producing quicksilver.

Within the last few years, since the abolition of the duty, the price has been reduced so low that there is little profit to quicksilver miners, and there are now only eight or ten mines being worked in California. The Spanish and Austrian mines, with rich ore and cheap labor, compete successfully with our home product under present circumstances. Many articles necessary in working quicksilver mines, particularly iron and steel, are subject to high duties. Empty quicksilver flasks are subject to a 35 per cent duty, and most of these flasks used in California are second-hand ones returned from China, on which the quicksilver manufacturers here are obliged to pay the high duty, often paying many times on the same flasks, while new flasks filled with quicksilver are imported into New York from Europe free of duty.

Owing to these facts all of the American market east of the Rocky mountains has been lost to home manufacturers and supplied with a foreign product, which pays no duty or revenue to the Government. The imposition of a duty on quicksilver would lead to no hardship or damage to other industries in this country; the article being used over many times in gold and silver mining, so that the small advance in price would practically be almost nothing in the cost of mining, while the only other industries which would be affected—the manufacture of vermilion and the manufacture of medicinal preparations from mercury, both of which are small in comparison with the manufacture of quicksilver—are now protected by a duty. The control of the Spanish product is a monopoly in the hands of Messrs. Rothschild. Before we began to produce quicksilver in California the price of the foreign was three times what it is now.

All other metals of American manufacture from native ores, iron, copper, zinc, lead, etc., are protected by high duties; quicksilver, which under present foreign competition seems to require it more than any other, forming almost the only exception. The California manufacturers consider that unless a duty of at least 20 cents a pound is imposed they cannot compete with the Spanish and Austrian Governments, and get a fair return for capital invested. The only producing mines in this country now are the New Almaden, Sulphur Bank, Great Western, Redington, New Idria, Napa Cons., Great Eastern, Etna, and Bradford. All of these are in California.

**LICK OBSERVATORY.**—Arrangements are being made for the transfer of the Lick Observatory from the Trustees of the Lick Trust to the Regents of the University of California. The Regents have received \$100,000 of the balance in hand, and in a few weeks will accept the completed observatory and the balance of the funds. Regente Hager, Hallidie, and Phelps have been appointed a committee to make arrangements for the ceremonies attending the transfer.

The borax works of William T. Coleman at the West End, Alameda, will close down in a few days and will not resume operations until after the summer months. Their closing will throw about 17 men out of employment, and is due to the fact that there is on hand a large quantity of manufactured borax.

## The Mining Laws.

We have several times referred to the amendments to the mining laws proposed by Senator Stewart of Nevada. The bill which he introduced was passed by the U. S. Senate on Tuesday. It was reported favorably by the Committee on Mines and Mining, and passed without debate.

The bill makes some material changes in the mining laws, some of which will please the miners, and others may not.

Among the changes are the following: The amount of work necessary to hold a placer claim is reduced from \$100 per annum to \$50, and limits the amount of placer ground that may be included in a patent to 160 acres. It fixes 12 o'clock noon, on the first day of August, as the commencement and end of the year for annual work, instead of midnight of the 31st of December, as now fixed by law. This change was made to allow relocation to be made in daylight and in summer-time, when the mountains are free from snow. This will please miners everywhere.

It requires, when the annual work is performed, the filing of an affidavit, showing the work performed, in the County Recorder's office of the county in which the mine is situated. It allows the affidavits, which are required to be made under the mining law, to be sworn to before any officer authorized to administer oaths in any State or Territory in the United States. It reserves the right of way through or over any mining claim for roads, ditches, canals, cuts and tunnels for the purpose of working other mines as now provided by law, and provides that any damages occasioned thereby to the mine-owner shall be assessed and paid in the manner provided by law for the condemnation of private property for public use in the States and Territories in which the mines are situated.

The most important provision is that which says that no person shall acquire by location or possession more than one mining claim on the same vein, nor shall any person relocate a claim which he has previously located. This is to prevent repeated locations of the same claim by the same person to evade the provision requiring annual work. The restriction to one claim on the same lode is really what the original law meant, but it has been construed otherwise, and this declaration makes its meaning certain.

Since this bill was introduced, the provisions concerning prevention of relocation and taking up more than one claim on a lode have been discussed by several of our correspondents. There is a difference of opinion as to benefits to be derived from such a law. Some miners do not want to be compelled to do annual work to hold their claims, and prefer to relocate. In fact a good many have this preference, and, no doubt, will "get over" the present laws by getting some one else to relocate for them, and then nominally buying them out. It must be said, however, that our mining laws are very liberal, and a man ought to find out in a year whether his claim is worth keeping or not. If it is worth keeping, it is worth, at least, working upon enough to cover the annual expenditure clause of the law. While the new provision may work hardship in individual cases, and probably will, it will, nevertheless, release for location many claims which have been held from year to year without any work being done upon them. If people who will work them will take such claims, it will be better for the general mining industry than it is to have them lie idle.

A TELEGRAM from E. S. Bahcock, Jr., who is now in the East, announces that he has secured funds for the erection of a blast-furnace on North Island, a part of the Coronado peninsula, San Diego county, with a capacity of 100 tons a day. Work will be begun at once, and the product will be used by the foundry just established on the beach.

MEN who have returned from the new Salmon river mines say that only about 40 men there have work, while some 200 are idle. At present state of development, it is a bad place for poor men to go to.

AN Aspen (Colo.) special to the News says: The famous Aspen Side Line mining case, which has been in the courts for nearly two years, was to-day settled by a compromise.



## Gold Ores.

## Milling by the Continuous Process.

(Written for the PRESS by E. C. VAN BLARCOM.)

This process—more generally known as the "Boss Process"—was patented in 1881 by the inventor, M. P. Boss of San Francisco. Old millmen did not take kindly to the process, and without giving it a just trial condemned it. That the process has a sound metallurgical basis is proven by the fact that wherever it comes in competition with mills working on the old principle of settling the sands in tanks and then changing them into the pans, it displaces them. For example, at the Gloster mill in Montana the Boss process showed an increase of ten per cent in the saving, and this at a saving of some \$2000 per month in the labor account of the mill. The process is now being introduced into the California mill on the Comstock, supplanting the old settling-tank system, and many other cases might be cited.

While it is generally conceded that the process is all it claims to be in the milling of silver ores, it is not generally known that the process is equally applicable to the milling of gold ores, especially to those ores in which the gold is in a very fine state of division or is "rusty."

During the winter of 1886-7 I was connected with the mill of the Jay Gould Mining Company (near Helena, Montana), and through the courtesy of the general manager, Mr. M. E. Downs, I am permitted to use some data which I acquired in my official position.

The mill is a 10 stamp "Standard Continuous Mill." The ore treated in this mill was essentially a gold ore, although, strictly speaking, it was an ore of gold and silver, as will be seen from the following assay, which represents the average for the month of April, 1887: Gold, 1.247 ounces per ton 2000 pounds; silver, 5.42 ounces per ton 2000 pounds.

The gold was free and in an infinitely fine

bons, the mill superintendent, that when they got "down to business" the average saving was 82 per cent of the gold, the total saving, including the sulphurets saved by the Frue vanners, being 92 per cent of the value contained in the ore.

The process, as practiced at the Jay Gould,

spring. The bottom of the grinding-pan is on a level with the top of the main line of pans; the muller runs at 72 revolutions per minute.

From the grinding-pan the pulp discharges into No. 1 of the main line of pans (of which there are six). Pans Nos. 2 and 5 are fitted with automatic arrangements for introducing

introduced into all the pans, excepting No. 1, which is only charged once on a run, every hour, the same amount having been withdrawn previously. The charging and discharging of the quicksilver is effected by a siphon tap at the bottom of and on one side of the pan.

The discharged quicksilver runs through pipes to the amalgam safe. The strained quicksilver from the safe is raised by an elevator to a tank above the level of the pans and by a line of pipes is drawn into the siphon, or more properly speaking, quicksilver trap, when needed for charging.

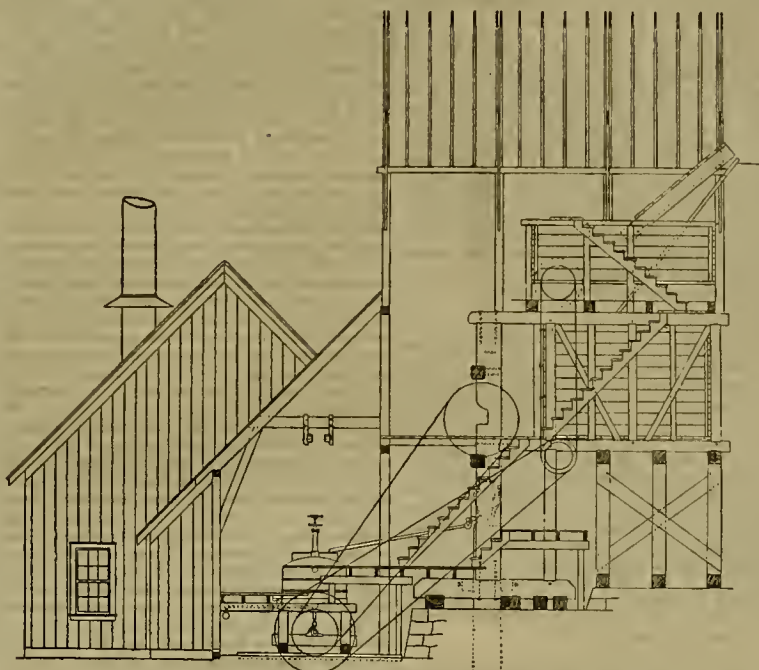
About four inches from the top the pans are connected by a four-inch piping; in the same manner the pan system is connected with the settlers, the settlers being similarly connected one with another. Through these communications the pulp flows continuously, taking about eight hours to pass through the system. In the settlers, of which there are three, the pulp is diluted by means of a stream of fresh water; the settlers run at 16 revolutions per minute.

When necessary, for repairing or other causes, any pan can be cut out of the system, the pulp being made to pass it by means of an arrangement working on the principle of an injector; the pans are emptied by means of a steam siphon.

The pans and settlers are set in a line over the main shaft with which they are connected by a friction-clutch and bevel-gearing. The pulp as it came from the battery was so coarse that only 40 per cent would go through a 40-mesh sieve, while 90 per cent of the tailing sample passed through a hundred-mesh sieve.

There were employed in the mill a panman, batteryman and roustabout on each shift of 12 hours. The average milling was three tons to the stamp in 24 hours.

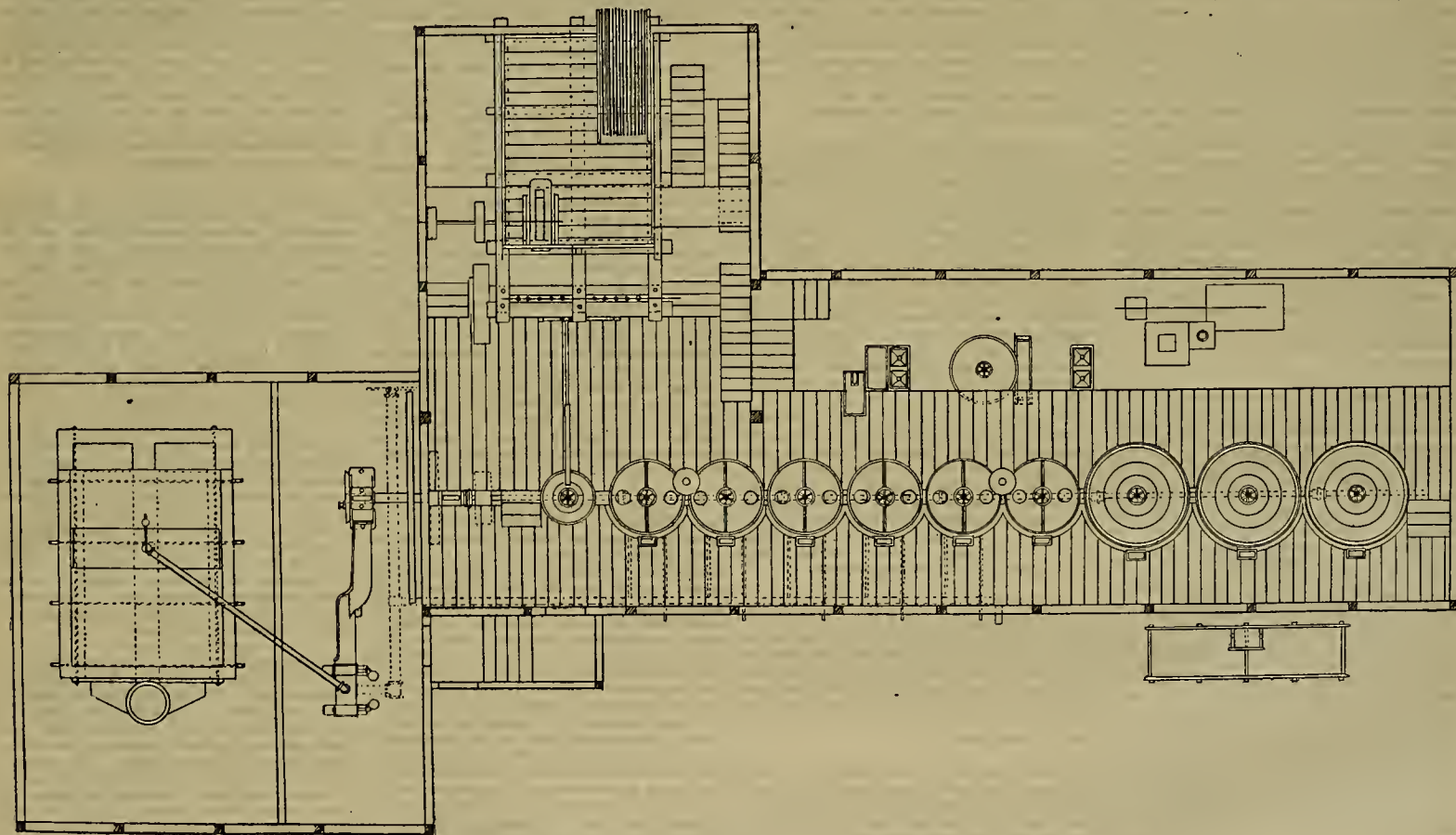
The general arrangement of the mill is shown in the accompanying sketches. It will be noticed that there is very little grading neces-



SECTIONAL ELEVATION OF CONTINUOUS MILL.

was essentially as follows: The ore was crushed in an ordinary battery fitted with No. 3 slotted screens; barely enough water to

chemicals. At first, salt and bluestone were introduced into the charge at pan No. 2, and quicklime at No. 5. Experimenta proved that



PLAN OF TEN-STAMP STANDARD CONTINUOUS MILL FOR GOLD AND SILVER ORES.

state of division, in samples running as high as 60 ounces to the ton; it was impossible to detect it with the naked eye.

The matrix was a close-grained quartz carrying some oxide of manganese and iron pyrites. As the ore was delivered at the mill, it was more or less mixed with a hard argillaceous rock and soft clay, both of which, under the stamps, produced abundant slimes.

The milling for the month referred to showed a saving of 77.6 per cent of the gold, and 45.3 per cent of the silver contained in the ore. Average fineness of the hullion was 988. These percentages were low for known causes. I have since been informed by Mr. W. B. Gih-

run out the pulp was admitted into the battery. Samples of the pulp showed the water to be about 60 per cent of the weight. From the battery the pulp discharged through a 2½-inch pipe into the center of a small grinding-pan. The grinding-pan is three feet six inches in inside diameter; the muller-shoes and pan dies are solid circular rings with radial grooves for facilitating the discharge of the ground pulp, after the manner of the old-fashioned stones in flouring mills. To insure grinding and compensate for the wear on the shoes and dies, a stout steel spring is fitted under the cap of the driver on the pan-spindle, a turn of the wheel from time to time sets down the

the use of bluestone increased the percentage of silver saved but diminished that of the gold; the use of salt alone had no effect, hence the use of these chemicals was discontinued. The alkaline action of the lime was found beneficial for keeping the quicksilver clean and reducing any "floured quick."

In running, the muller in pan No. 1 was set to grind, while the remainder of the pans ran with the mullers up, the rate being 72 revolutions per minute. The pans are heated by the exhaust steam from the engine. The details of the pan were fully illustrated in the PRESS of February 25, 1888.

About 200 pounds of fresh quicksilver was in-

itary—in fact this mill is much more economical in the details of construction than an ordinary mill.

THE Drumlummon mine of Montana yielded last year \$2,040,672. The company expended on revenue and permanent improvement account \$746,621. They crushed 75,000 tons last year. Average yield of high-grade ore, \$40.87; average of low grade, \$13.71.

MITCHELL has proposed an amendment to the Indian Appropriation Bill, authorizing the purchase by the Government of such portions of timber and mineral lands in the Coeur d'Alene reservations as the Indians are willing to sell.



## MECHANICAL PROGRESS.

## Activity in Car and Locomotive Building.

There is every indication that more cars and locomotives will be built in the United States during 1888 than ever before in any one year. The number of locomotives, and passenger, freight, and baggage cars annually built has been constantly increasing for the last five or six years. The number built during 1886 was as follows: Locomotives, 26,415; passenger cars, 19,252; baggage and mail cars, 6325; freight cars, 845,914—a total, aside from locomotives, of \$71,491. It is estimated that the total of passenger cars alone will more than double the build of last year.

Very few persons are aware of the immense consumption of iron involved in car building. A passenger car requires two tons of bar iron and three tons of wheels and axles. For freight cars the aggregate is somewhat less. Over 4,000,000 tons of iron and steel will probably be required for car construction the present year, aside from the enormous amount involved in locomotive construction, of which probably 30,000 will be built. Car and locomotive building will make an enormous demand for the products of our shops and forges for this business alone.

## Iron and Steel Cars.

In addition to the use of iron for the construction of cars in the ordinary way, there is the fullest reason to believe that the bodies, as well as the running gear of passenger cars, will soon be entirely constructed of iron. Various designs have been proposed, but one of the best appears to be a design which has recently been placed before the public by Mr. C. W. M. Smith of this city. The design was submitted to the careful inspection of the late master mechanic of the Central Pacific railroad, Mr. A. J. Stevens, who said in writing that it was "wholly practical and will be as tight as a drum on the track without reverberation. It is the car of the near future, and you can build it much lighter than you think for."

The whole interior of the car will be constructed of malleable steel. The surface of the metal sheets inside will simply be faced with a thin lining of linoleum, tastefully embossed and practically incombustible. The upholstery will be finished with suitably ornamented and embossed leather or compressed paper. The floors and platforms will be constructed of a single sheet of steel. The sides, ends and roof will be connected with angle beams of a peculiar and fitting construction. It is claimed that a car can be constructed in this manner cheaper than one of wood, and, when constructed, it will be a tower of strength and a fortress as well. An express car of such construction with iron shutters would be perfectly safe against any ordinary attack of robbers. In cases of collisions it could not be telescoped, and there would be no danger from splinters, which usually cause the principal injury to passengers; neither would there be any danger whatever from fire. In cases of violent shocks the couplings would part or the colliding cars be thrown sideways or endways without penetration or breaking up. Iron must soon become the material for car construction.

**STEEL RAILWAY AXLES.**—Steel, says the *American Exporter*, in all probability will soon be as well established in practical use for railway axles as it is now for rails. Mysterious failures heretofore noted in use of steel axles can be prevented by a toughening process, which has been in use at some Pennsylvania steel works during the past year with phenomenal results. The most severe inspection test has failed to show any irregularity or weakness in the axles. The supplementary test of 50 blows of 1640 pounds drop at 25 feet has now been passed by 50 consecutive test axles. This makes a test tenfold more severe than the railroad inspection, and is a guarantee of a safe axle. The process consists in heating the axle to the temperature at which its carbon changes to hardening carbon, and then, while it is being rapidly revolved, immersing it in a water bath, and also at the same time throwing on it a series of submerged jets. After cooling the outside the axle is removed from the bath while there is sufficient heat remaining in the interior to raise the whole mass to a low red heat and allow the carbon to change back to the non-hardening state. The main object of cooling rapidly through a certain range of temperature is to prevent a weak crystal formation.

**THE DESIRABILITY OF REGULAR MOTION FOR MACHINERY.**—It is always desirable that the motion of a machine should be regular. Even supposing that the first mover is perfectly constant and equal in its actions, the machine may not be regular in its movement, from the irregularity of the resistance to be overcome. But still, says a contemporary, if both the power and the resistance were perfectly regular, the machine would not be perfectly uniform in its motion, for there are particular positions in which the moving parts of a machine are more efficacious than others, as in the crank, for instance; hence the energy of the first mover will be unequally transmitted, and irregularity in the motion of the machine will constantly follow. The motion of some machines bears a constant tendency to accelerate, others to retard; and others alternately to accelerate

and retard; and, perhaps, in no case whatever can the motion of a machine be said to be perfectly uniform; but common sense will point out the necessity of having the motion as uniform as it can be made, else it will increase in proportion as it is multiplied through the machinery.

**A UNIVERSAL WHEEL.**—At the last meeting of the "Société d'Encouragement à l'Industrie," M. Collignon spoke thus: "The universal character of the wheel invented by M. Pichon consists in the fact that this wheel, with movable feathers, is adapted to work in air as well as in water, and according to different circumstances, it may serve for a hydraulic motor, a windmill, a meter for water or gas, a pump, ventilator, propeller, etc. It was very much appreciated when introduced to the Congress held at Toulouse by the 'Association Française pour l'Avancement des Sciences,' and several members considered that besides realizing great progress, it would prove the source of a new series of improvements to be adapted to hydraulic receivers and propellers."

**SOLDERING ALUMINUM.**—R. Angelo Ball, in *Lock and Bell*, states that aluminum can be soldered in the same manner as brass. When hard solder is used let it be an alloy of two parts pure silver and one part yellow brass. Care must be taken to avoid overheating the aluminum. It can be cast in dry or metallic molds. It can be welded by the use of electricity. This is not a recent discovery. Mr. Bell says: "I learned how to manipulate or work upon it 15 years ago. Four years ago Percival Frazer, the well-known chemist and metallurgist expert, brought to me a bunch of aluminum keys, one of them broken. I repaired it by the use of the alloy above mentioned. He informed me the keys were made at a locksmith's shop in Paris, in 1882. That they were all cast from a bunch he carried."

**ALUMINUM BRONZES.**—The results obtained in testing the new aluminum bronzes are indeed remarkable and open up a new and interesting field of research. The enormous strength of these bronzes and their lightness allow of some very important applications. Thus, the weight of propeller screws can be reduced one-third, and yet be increased in strength and elasticity. It can be used instead of steel in making guns, and they will be more effective. They can be made at one-fifth less than the cost of steel guns, and 68 per cent of the metal in them can be remelted and used over again any number of times. Heavy machinery can also be made of this remarkable metal. There is, no doubt, an infinity of uses for these new bronzes.

**COPPERING SOLUTION.**—The well-known machinist copping solution can be composed of one ounce of sulphate of copper, or blue vitriol, dissolved in about four ounces of water. The addition of a teaspoonful of nitric acid will make the solution work quicker. This solution has but little or no effect upon the brass when simply placed upon it, but put some of the solution on the place to be coppered, and in the solution hold any small piece of steel or iron, letting it touch the brass, and a very interesting thing will be soon seen. A film of copper soon covers the brass wherever there is any of the solution. The solution can also be applied drop by drop with a piece of iron or steel wire.

**HARDENING METALLIC WHEELS.**—To give a greater solidity and density to the metal for wheels, it has been suggested, while the casting is cooling, to give it a rapid rotary movement near the edge where it will ultimately work most. The centrifugal force gives the desired result, in pressing the liquid metal against the outer parts. This process, used in England by Mr. Webb, some years ago, has lately been put in practice in a Pittsburgh foundry.

**A STEM-WINDING SCREWDRIVER** has been made in Philadelphia, with the handle in two parts, said parts being capable of rotating one upon the other. A stop-pin and pawl limit the movement of the shank in one direction, while the top of the handle will move backward without turning the shank. The mechanism appears to be very similar to the principle of a stem-winding watch.

**SPIRAL SPRINGS.**—One of the rules for spiral springs, when made of round steel, is to multiply the cube of the diameter of the steel wire in inches by the amount that it is to be deflected for each coil, and this product by 75,000, then divide by the diameter of the spring, measuring from the center of the wire, and the quotient will be the force exerted in pounds.

**INVENTOR OF THE SCREW-ANGER.**—The screw-anger was invented by Thomas Garrett about 100 years ago. He lived near Oxford, Chester county, Pa. The single-screw auger was invented by a Philadelphian, and it is said to be the only one used with any satisfaction in very hard woods where the double-screw augers become clogged.

**COPPER FOR ELECTRICAL PURPOSES.**—Four of the largest manufacturers of copper wire for electrical purposes in the United States used, in 1887, 13,500,000 pounds of copper.

The United States consumes more rails and other railroad supplies than all the rest of the world.

## SCIENTIFIC PROGRESS.

## A Moral and Natural Mystery.

What a monstrous specter is this man, the disease of the agglutinated dust, lifting alternate feet, or lying drugged with slumber; killing, feeding, growing, bringing forth small copies of himself; grown upon with hair like grass, fitted with eyes that move and glitter in his face; a thing to set children screaming, and yet looked at nearlier, known as his fellows know him, how surprising are his attributes! Poor soul, here for so little, cast among so many hardships, filled with desires so incommensurate and so inconsistent, savagely surrounded, savagely fathered, irremediably condemned to prey upon his fellow-lives—who should have blamed him had he been of a piece with his destiny and a being merely barbarous? And we look abroad and behold him instead filled with imperfect virtues; infinitely childish, often admirably valiant, often touchingly kind; sitting down, amid his monetary life, to debate of right and wrong and the attributes of deity; rising up to do battle for an egg or die for an idea; singling out his friends and his mate with the most cordial affection; bringing forth in pain, and rearing with long-suffering solitude, his young. To touch at once the heart of his mystery, we find him in one thought, strange to the point of lunacy; the thought of duty; the thought of something owing to himself, to his neighbor, to his God; an ideal of decency, to which he would rise if it were possible; a limit of shame, below which, if it be possible, he will not stoop. The design in most men is one of conformity; here and there, in picked natures, it transcends itself and soars on the other side, arming martyrs with independence; but in all, in their degrees it is a bosom thought—not in man alone, for we trace it in dogs and cats whom we know fairly well, and doubtless the like point of honor sways the elephant, the oyster and the louse, of whom we know so little.—*Robert L. Stevenson in Scribner's.*

**PROOF OF THE EARTH'S MOTION.**—Any one can prove, remarks a contemporary, the rotary motion of the earth on its axis by a simple experiment: Take a good-sized bowl, fill it nearly full of water, and place it upon the floor of a room which is not exposed to shaking or jarring from the street. Sprinkle over the surface of the water a coating of lycopodium powder, a white substance, which is sometimes used for the purposes of the toilet, and which can be obtained at almost any apothecary's. Then, upon the surface of this coating of powder, make with powdered charcoal a straight, black line, say an inch or two inches in length. Having made this little black mark with the charcoal powder on the surface of the contents of the bowl, lay down upon the floor, close to the bowl, a stick or some other straight object, so that it shall be exactly parallel with a crack in the floor, or with any stationary object in the room that will serve as well. Leave the bowl undisturbed for a few hours, and then observe the position of the black mark with reference to the object it was parallel with. It will be found to have moved about, and to have moved from east to west, that is to say, in that direction opposite to that of the movement of the earth on its axis. The earth, in simply revolving, has carried the water and everything else in the bowl around with it, but the powder on the surface has been left behind a little. The line will always be found to have moved from east to west, which is perfectly good proof that everything else has moved the other way.

**PLAUSIBLE THEORY OF THE BASIS OF DIAMOND FORMATION.**—Prof. Simmler brings forward the somewhat plausible theory that the basis of diamond formation is liquid or liquefied carbonic acid. Indeed, facts observed by different savants tend to show, it is said, the presence of this agent in the coating of the most valuable gems. Upon the bursting of such crystals there are often found to occur two liquids in the cavities, the one behaving like water, the other like liquid carbonic acid. On one occasion, indeed, it was observed that the liquid in a quartz crystal which was dashed to pieces scattered its contents around with a great noise, burning holes in the handkerchief wound around the hands of the experimenter. The acid content itself had disappeared. Under these circumstances M. Simmler argues that if carbon be soluble in liquid carbonic acid, it would then only be necessary to subject the solvent to slow evaporation. The carbon would thereby be deposited, and, by taking proper care, assume crystalline forms, and in evaporating quickly the so-called black diamond, which, in the state of powder, is much used for polishing, the colorless diamond might be produced. Though the liquid in question has never been subjected to a chemical analysis, the formation of liquid carbonic acid in the interior of our globe may, it is admitted, be considered as highly probable.

**NEW APPARATUS FOR TRANSMITTING FORCE.** A French engineering professor, M. Raymond Sayers, of the Louvain university, has invented an apparatus for transmitting force between bodies moving at greatly varying velocities without accompanying disadvantage of a violent collision. The method consists in furnishing the contact surface with steel brushes, which, by the entanglement of their "bristles," are enabled to grip one another. In this way

the swiftest motion may be imparted gradually to a perfectly stationary body, and a maximum of shock can be arranged which can never be exceeded, be the impelling force and velocity what they may. The inventor has in view chiefly the requirements of quickly moving lifts, railway trains and the other bodies moving at high speed and with great momentum; and if it is possible to produce in this way an effective brake, or to obtain an automatic working of railway signals, much will be done to minimize some of the most serious perils which at present threaten life and limb to industrious occupations.

**ANOTHER USE FOR THE MAGNET.**—The magnet has long been used for various purposes in the arts. It is used for separating iron as it occurs in various forms in sacks of wheat as the grain passes on its way to the rollers or stones; it is also used to separate iron-sand from the mass of earthy matter in washing for gold. It is also employed for various other similar purposes; but the latest application is in paper manufacture. In paper-making a difficulty is experienced from the fact that iron is apt to discolor paper by rusting after it has been abraded from the paper-making machinery. Magnetism has, therefore, been called in by a German manufacturer to clear away the iron specks. A series of magnets are arranged in the form of a comb, and hung across the stream of pulp and water, which in passing the magnetic teeth of the comb delivers up the iron particles.

**PHOTOGRAPHING ON METAL.**—An Eastern photographer has devised a process for producing photographs on metal. It is said that up to the present time no one has been able to do this. The work exhibited is very pretty and very delicate. The pictures were executed on watch-cases, buttons, lockets, breastpins, and other pieces of metal. The process is a secret one and the negatives are taken instantaneously and by means of a flash light. A number of negatives of guests were taken and developed by a liquid which, the inventors of the process claim, is a vital part of the production of photographs on metals.

**MAGNETISM OF THE MOON.**—M. Ligner, an Austrian meteorologist, claims to have ascertained after careful investigation that the moon has an influence on a magnetized needle varying with its phases and its declination. The phenomenon is said to be more prominently noticeable when the moon is near the earth, and to be very marked when she is passing from the full to her first or second quarter. The disturbances are found to be in their maximum when the moon is in the plane of the equator, and greater during the southern than it is during the northern declination.

**FLOWERS AND MINERALS.**—Dr. R. W. Raymond lately called attention to the reputed connection between certain plants and the metals in the underlying soil. Thus the zinc violet or *Galmeyveilchen*—sometimes regarded as a distinct species under the name of *Viola calaminaria*—points out the hills containing calamine, or zinc ore, in Rhenish Prussia and Belgium. The lead plant, *Amorpha canescens*, is believed by American miners to grow only in localities containing galena, and *Eriogonum ovalifolium* is probably destined to be known in the West as the silver plant.

**ELECTRIC EARTH CURRENTS.**—M. J. J. Landerer has been engaged in the study of electric earth currents, and has obtained some interesting results. By means of a line-wire having an azimuth S. 54 deg. W. in relation to the magnetic meridian, he finds that the currents travel from six to seven times southwest to northeast for once that they travel in the contrary direction. On many days they change in direction several times, especially during great atmospheric disturbances. These observations were made with a Deprez galvanometer and extended over nine years.

**DOES THE MOON INFLUENCE EARTHQUAKES?** Observations on the part of a large number of scientists prove that earthquakes are more frequent at the time of full moon and change of the moon than at other times, and also more frequent when the moon is nearest the earth or when she is on the meridian. The cause to which this fact has been assigned is the action of those forces which produce the tides of the ocean; their similar influence upon the solid land strata leads to their disturbance in the shape of earthquakes.

**AN INTERESTING EXPERIMENT WITH WATER.** The apparent paradox that the most transparent water is at the same time perfectly opaque from a certain point of view is shown by a simple experiment. Partly fill a glass goblet with clear water, and hold it a little above the level of the eye and distant a foot or more. No object can be seen when held just over the surface of the water, but the water surface appears like a burnished mirror.

**THE CONSUMPTION OF POWER.**—It has been ascertained that the horse-power required to run a machine-shop, in which 700 men were employed, was 135.05, of which 66.81 horse power was required to run the shafting, blowers and such things as were not machine tools, leaving 68.24-horse power to run the machine tools, or a trifle less than one horse power for ten men.



## GOOD HEALTH.

## The State Medical Association.

## The Cancer Discussion.

The State Medical Association held its 18th Annual Meeting in this city last week. Among other matters considered was a report from the Committee on Medical Legislation, suggesting several matters for special legislation, some of which would, no doubt, be very proper. According to the report of a morning paper, cancer formed a leading topic of discussion on Wednesday. Dr. W. E. Taylor of this city is reported as remarking that in the removal of cancer from 604 patients, of which mention has been made, 238 died, which the speaker declared to be very great mortality. The immediate mortality by removal of the tongue for cancer is comparatively small.

A discussion on the subject followed, being opened by Dr. Thomas W. Huntington, who is in charge of the railroad hospital at Sacramento.

He said that it was about time a halt was called on indiscriminate surgery. The lawgivers of surgery were not always surgeons.

Another surgeon from one of the interior counties enumerated several cases of cancer which he had treated. One case was that of a young woman who had cancer of the breast. He told her that she could only live 12 months if an operation was not performed, while she might exist for three years if the operation was made. She consented to the operation. This was a couple of years ago. A short time since she sent for him and he found that a cancerous deposit had formed again. She asked him if she could be cured. He told her that he could cut her body in two, and that in that way the lower portion might be saved; that was all he could do for her.

This side-splitting anecdote, and several ones like it, was received with much laughter. The speaker believed that there was no one whatever for cancer.

We submit that such a grave body as the State Medical Association ought to find some other matter for hilarity than that indicated above. We fully agree with Dr. Huntington that it is about time a halt was called on indiscriminate surgery, referring, as he evidently did, mainly to cases of cancer. We further submit that the matter of indiscriminate surgery in cancer cases might well be included in the matters for legislation called for by the association.

He said Dr. Lane differed from Dr. Huntington. He said that out of 88 cases of cancer which he had watched, four-fifths had recovered. We suppose the doctor referred exclusively to treatment with the knife. If so, it is certainly a most remarkable statement. We have been repeatedly assured by physicians and surgeons of undoubted standing in this city and Oakland that one case in 15 or 20 saved by surgical operation is considered a good average. The above statement can scarcely be received, even by the most credulous, without verifying facts. We venture the assertion that instead of saving 80 per cent by the ordinary treatment of the profession by knife, etc., not more than 10 per cent can be verified by statistics. If we are wrong, we should be pleased to publish any statements correcting these remarks which may be properly verified.

## Cancer on the Tongue.

Dr. W. E. Taylor of this city, in his reported remarks at the late Medical Association meeting, said that "the immediate mortality by removal of the tongue for cancer is comparatively small." We presume what was really said was, "removal of the cancer from the tongue." The mortality of such cases is undoubtedly "small," but the favorable results or permanent extirpation of the cancer is much smaller.

In regard to such removals we have before us a very interesting letter from Mr. Phil. R. Smith, of Victoria, British Columbia, addressed to Mrs. Dr. Cook of this city, who writes under date of April 1, 1888, as follows:

"The tongue has not troubled my wife now for the past two weeks; but previous to that time I was somewhat afraid, from occasional pains, of the cancer returning. I am now satisfied with the result and the patient way in which you worked with it. You have done more than I dared to hope for." The letter concludes with many thanks for the successful treatment of this case of cancer on the tongue.

The above case was one which was pronounced unmistakable cancer by several physicians of Victoria. Before submitting herself to the treatment of Mrs. Cook the cancer had been twice removed by the knife, and once burnt out with caustic, but it making its appearance for the fourth time induced her to try some other treatment, as above noted. We once more repeat our honest belief that the use of the knife for the extirpation of cancer is barbarous and ought to be made a subject of legislation. We have given in these columns abundant reason for our belief that cancer can be cured by constitutional treatment without either knife or

canstic, and again challenge any rebuttal of the evidence which has been published in these columns. If the Medical Association, which met in this city last week, had appointed a committee to investigate this matter, we believe it would have resulted in more good for the profession and for humanity than all which that body, as such, has done for years. But we suppose that suffering humanity and medical progress will have to stand aside to do reverence to an antiquated and barbarous code of medical ethics which has come down from the dark ages, and which is a bar to any investigation of any medical discovery outside of the profession until public opinion actually forces such discoveries upon their attention and practice, as it has done in numerous instances and eventually will do in this.

## Health of the State.

The report of the State Board of Health for March shows a very satisfactory condition of immunity from disease and death. The fatalities from 87 cities and towns with an estimated population of 734,000 were but 1066, or 1.4, per thousand.

Smallpox is rapidly dying out. Fifteen deaths from that disease are reported for the entire State, only four of which occurred in San Francisco.

Reports of sickness from 99 localities indicate a very favorable diminution of diseases throughout the State for the past month. This is especially noticeable in acute diseases of the lungs and inflammatory affections of the bowels.

Diphtheria during the month is reported as having exceeded its former boundaries, and invaded localities where it has not heretofore been prevalent. The general conclusion in regard to this disease, according to the report before us, is, "that it is a specific poison, not depending on defective sewerage or sewer gas, as we find it in localities without sewers, as well as in those well sewered; among the rich as well as among the poor; in cities, and in remotely isolated dwellings. The disease is communicable, and can be carried long distances by infected persons, clothing, and railway cars. It can only be arrested, or at least restricted, by the thorough disinfection of the persons and premises of those in contact with the dread disease. It should, therefore, be legally incumbent on every person to give notice of the disease whenever present on their premises, or in their families. We hope such a law will be enacted in our next Legislature.

The dreaded disease of cancer claimed 17 victims in this city alone during the month.

## USEFUL INFORMATION.

## Soapstone Against Rust.

Frank C. Goodall, surveyor of shipping to the Trinity House, Richmond, London, writes to *Iron* as follows: I have for some time experimented with a material called Chinese soapstone as a substitute for the ordinary metallic pigments used in paints, and I have found this soapstone to possess qualities highly calculated to prove an effectual remedy against this danger of rust. In China, soapstone is largely used for preserving structures built of sandstone and other stones which are liable to crumble under atmospheric influences, and the covering of powdered soapstone in the form of paint on some obelisks in China, which were hewn out of stone liable to suffer under atmospheric influences, has been known to preserve the same intact for hundreds of years. Soapstone may, therefore, be said to have extraordinary qualities in withstanding atmospheric influences which have a great deal to do with the corrosion of steel and iron, for it is well known that the inside of a steamer, which is not exposed to the incessant action of salt water, like the bottom, corrodes very much more quickly than the outside. Soapstone has, however, another quality which eminently adapts it as a protective paint on ships, and that is the extreme fineness of its grain. Ground soapstone is one of the finest materials which can be produced, and from the experiments which I have made I have found nothing to take hold of the fiber of iron and steel so easily and firmly as soapstone. It is, moreover, lighter than metallic pigments, and, if mixed as a paint, would cover a larger surface than zinc white, red lead or oxide of iron.

PHOTOGRAPHY AND FORGERIES.—Dr. Jeserich of Berlin has enlisted the services of photography in an important field. He employs it in the discovery of forgeries in documents. Recently he photographed an entry in a ledger handed to him by the public prosecutor as suspicious. As the event proved, the forgeries had been made with a bluish ink, which appeared very indistinct in the photograph taken, while the original entries, which had been written with a black ink, came out sharply defined. Subsequent chemical examination of the portions of the writing which the preliminary photographic test had disclosed to have been forged fully confirmed the discovery made. In a second case, it was necessary to establish certain forgeries in a check. Photographic aid disclosed the fact that the month of *Mai* (German for May) had been changed to "April" by converting the second down stroke of the capital letter *M* into a *p*, transforming the letter *a* into an *n*, and adding an *l*. The

great value of these photographic determinations consists in enabling the expert to supply direct proof in support of his opinion by submitting accurate reproductions, while chemical examination furnishes merely more or less circumstantial evidence. Moreover, in employing photography the exact picture of the document forged is preserved, while by chemical examination the object is sometimes completely destroyed.

HOT WATER FOR PLANTS.—It is a fortunate circumstance, says *Vick's Magazine*, that a plant will endure a scalding heat that is fatal to most of its minute enemies. Water heated to the boiling point, poured copiously over the stem of an enfeebled peach tree, and allowed to stand about its collar, will often have the happiest restorative effects. Trees showing every symptom of the yellows have often been rendered luxuriantly green and thrifty again by this simple means. The heat is presumably too much for the fungus which has infested the vital layers of the tree, immediately under the outer bark. The London florists recommend hot water, up to 145° F., as a remedy when plants are sickly owing to the soil souring—the acid, absorbed by the roots, acting as a poison. The usual resort is to the troublesome job of repotting. When this is not necessary for any other reason it is much simpler to pour hot water freely through the stirred soil; it will presently come through tinged with brown. After this thorough washing, if the plants are kept warm, new root points and new growth will soon follow. A lady friend had a fine calla in a three gallon pot which showed signs of ill-health. On examination the outer portion of the filling was found moldy, in being in large part fresh horse manure. As repotting was inconvenient, the plant being in flower, hot water was freely used; it killed the mold, and the plant began to revive and was soon all right.

GALVANIZING WIRE CLOTH.—Heretofore the range of applicability of galvanizing wire cloth has been limited, eight meshes to the inch being about the finest grade capable of being done satisfactorily, because the meshes filled up with the coating metal. Mr. Benjamin Scarles, Sr., of Clinton, Mass., has, during the past ten years, been carrying on a continued series of experiments, with the object of overcoming the drawbacks incident to galvanizing, the result of which has been a process yielding the well-known silver finish. As ordinarily carried out, galvanizing has the tendency to impair the ductility and tenacity of the wire and produce what is termed "rottenness." This Mr. Scarles has overcome, and he has succeeded lately in galvanizing the finest wire, samples of which have been submitted to us, and which appear fully to bear out his claims. Another very interesting product is wire cloth, as fine as 50 meshes to the inch, coated perfectly without filling the meshes. Mr. Scarles is now putting down a plant on a large scale for the Clinton Wire Cloth Co. for producing galvanized fine wire and fine-mesh wire cloth.

A NEW IDEA IN PAVEMENTS.—A newly patented pavement is said to have been suggested by the surface of an elephant's tooth, which consists of intermingled layers of hard and soft material, so that the process of wearing always produces a series of ridges upon the surface. The new system of paving is the idea of Mr. Raynard, the English astronomer, and comprises the use of blocks having alternate hard and soft layers, such as Portland cement and a mixture of sand and cement, which are set upon edges so that the edges of these laminae form a wearing surface. The blocks are made four inches high, and may be worn to less than an inch without becoming smooth, like granite blocks.

STRENGTH OF WET AND DRY ROPES.—According to experiments mentioned in *Indian Engineering*, the tensile strength of a wet rope is only one-third that of the same rope when dry; and a rope saturated with grease or soap is weaker still, as the lubricant permits the fibers to slip with greater facility. Hemp rope contracts strongly when wet, and a dry rope 25 feet long will shorten to 24 feet on being wet.

LOCOMOTIVE SPEED.—The *Engineer* says there is no properly recorded instance of a locomotive ever attaining a greater speed than 80 miles an hour, and quotes Charles R. Martin as saying that higher speeds are mythical. Back pressure, and various resistances, including that of the air, will, our cotemporary concludes, prevent a speed higher than this being reached.

A CURIOUS ALLOY.—Put into a clean crucible an ounce of copper and an ounce of antimony; fuse them by a strong heat, and pour the alloy into a mold. The compound will be very hard and of a beautiful violet hue. This alloy has not yet been applied to any useful purposes; but its excellent qualities, independent of its color, entitle it to consideration.

QUICK WORK.—In Augusta, Ga., a tree felled in early morning was before nightfall of the same day converted into paper and sent out hearing the current news.

AMERICAN PATENTS.—The United States Government granted 21,378 patents during the year 1887.

## Remarkable Railroad Activity.

For the last six or eight months the country has witnessed the remarkable spectacle of nearly all the principal lines of railways, and especially the continental railways, being unable to handle the great rush of passenger and freight traffic which is being presented. The remarkable travel westward and the consequent movement of freight in the same direction has completely halted the efforts to dispose of it with any reasonable degree of promptness. Railroad managers early foresaw a large increase of business, and immediately went to work to prepare for this by ordering large numbers of new locomotives, cars, etc.; but the increase has been so much larger than could have been anticipated that the roads nearly everywhere still find themselves overcrowded with business. So great has been the rush that for months there have been freight blockades almost everywhere, and such long delays have unavoidably occurred, that in some instances freight shipments to California from the East have been detained fully three months beyond the time at which delivery should have been made.

## The Future Still Perplexing.

The railroad companies are everywhere redoubling their exertions to meet this continually increasing traffic. We see it stated that fully twice as many passengers are coming westward at this time as were coming a year ago, and all the evidence indicates that this rush will largely increase for the next year at least. Indeed there does not appear to be any evidence of a "let-up" for years to come. There is good reason to believe that the only limit of the movement in this direction will be the means of transportation.

To meet this and the demands in other localities, all the locomotive and carshops in the country are working to their utmost extent to fill the orders for rolling-stock, while two or three new lines of travel across the continent are in active contemplation or actual construction. The Southern Pacific has been constantly adding to its rolling-stock for the last ten months, both from their own and from Eastern shops.

They have at this time orders in Eastern shops for no less than 175 locomotives, and nearly all these orders have been sent in within the last three months. In order to relieve the present pressure, efforts have recently been made to purchase locomotives already constructed, but not such as they really desire. Mr. Huntington recently secured five large 10-wheel engines of this class and telegraphed the fact to Manager Towne, who, in speaking of the fact, said his only regret was that the number was not 25 instead of five. During the past year the Southern Pacific Co. has been extensively engaged in building locomotives at its Sacramento shops. The company has recently ordered 20 light switch engines to be used at their principal stations on this coast—at Los Angeles, San Pedro, Mojave, Oakland, San Francisco, Port Costa, Lathrop and Sacramento.

More cars will be built in the United States this year than ever before in any one year. As it requires two tons of bar iron and three tons of wheels and axles for each car, the demand for the products of the mills, foundries and forges will be very heavy for this purpose alone. It is estimated that 200,000 cars will be built. This number would require 400,000 tons of bar iron and 600,000 tons of forged and cast iron, making a total of 1,000,000 tons.

## The Demand for Rails

Is also exceedingly large. It was not long ago that the Southern Pacific contracted for 42,000 tons of steel rail, yet C. P. Huntington has recently given orders for 25,000 additional tons for use in building the branch lines in this State. Of the first contract about 20,000 tons have already arrived. Most of the former order had to be given to foreign mills on account of the scant American supply. The recent order, however, will be filled by the Eastern mills. A good many of the new rails weigh 62 pounds to the yard, while the others have a weight of 72 pounds.

Col. Fred Crocker is authority for saying that the Southern Pacific has had, until within a few weeks, over 40 different parties of surveyors at work in various sections of the State, and that they now have maps, profiles and located lines in every district where there is the slightest prospect for a railroad line. Ere this goes to press Mr. C. P. Huntington will have arrived in California, where he will remain some three months to take a general view of the wonderful degree of activity which is now in progress in this State, and to look more thoroughly into the need which now exists and which in the early future will call still louder for additional branch roads.

STEAM ECONOMY.—It is quite generally acknowledged that in the prevention of condensation in the cylinders of a steam engine lies almost the only hope of further augmenting economy. Not only is this true, but it is also certain that by preventing internal condensation not a little, but a considerable, loss would be avoided. The mode of action of steam in say, a triple-expansion engine is very curious. It is entirely different from that of any other working fluid, such as gas or air, and it has little or nothing in common with the theoretical action of the ideal fluid as elaborated by the mathematician and the physicist.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**REED AND ASKEY.**—Amador Ledger, April 21: The Reed and Askey mine and mill are kept running pretty steadily. The property is located near Irishtown, some seven or eight miles above Jackson. The mill is only five stamps, and very light stamps at that, crushing on an average less than a ton to the stamp per day. The ore yields between \$8 and \$9 per ton. Rock is taken from a tunnel and the ledge is three feet wide. It takes four men to run both mine and mill.

**ZEILE.**—The Zeile mill has been idle most of the week, on account of some repairs which are being done to the machinery at the hoisting works; putting up a new foundation for the engine, etc. At the old Kearsog mine, above Big Bar bridge, the tunnel is in 70 feet, running in a northerly direction; the face is in a hard formation. It is thought it will take 200 or 250 feet further to reach ledge matter. At the Cleveland they have just finished a cleanup of 60 tons, which we are informed yielded between \$10 and \$11 per ton in free gold. The mill has been shut down until either concentrators are put in or five more stamps added. They intend to sink both shafts 100 feet deeper and work to this end has already been started. This will give the old shaft a depth of 220 feet and the new shaft 120 feet. At the Riverside mine, north of the Cleveland, men are engaged in cutting a ditch from the Amador canal so as to pipe the surface with a giant, with a view of exposing the rich pockets which exist in that claim. They have taken out \$500 lately by simply panning out. Twenty stamps of the Kennedy are again in motion. A late cleanup at the Live Oak mine, near Stony creek, yielded \$2000—a highly satisfactory result from two stamps. Work at the big tunnel at Middle Bar has been entirely suspended. The Moore mill was started last Saturday. There is over 200 tons of ore to be crushed, which will keep the mill running eight or ten days. It is reported that the refuse dump will be crushed also.

## Calaveras.

**AT MURPHYS.**—Calaveras Prospect, April 20: The Oro Plata is quiet—no one at work at present. Owners from the East will visit the mine soon, when it is expected a new order of things will be brought about. It is a serious blow the closing down of the works, but we opine it will not be for a long time. Another mine will start up in the Stanislaus district, owned by San Francisco parties. A lot of machinery for Tom Goodwin's mill was sent to the river to-day.

**QUARTZ.**—A gentleman by the name of Matteson, from Angels, has recently purchased a quartz mine from Wm. Sanderson of Railroad Flat. The claim is located between Clark's place and the town of Railroad Flat, and is a continuation of the Poe lead. The rock is being taken to an arastra on Wet gulch, where it is milled. Some excellent rock has been run through the mill lately, and the owners are well pleased with the present outlook.

**ANGELS OUTLOOK.**—Mountain Echo, April 18: The quartz mining outlook for Angels and vicinity is brighter than any section to the mining regions of California. Extensive works are being put up on several mines here, and the ore now being extracted from nearly all of them mills large returns, besides, the ledges are wide and extensive. Without a doubt, the summer and autumn months will be livelier in this section than any time within the past 20 years.

**THE TIBERGHEIN MINE.**—Work has been resumed on the Tiberghien mine, situated about a mile west of this town. The mine has recently been booded to Mr. Chas. J. Nickerson, owner of the celebrated Gold Cliff mine. A force of men is now engaged in sinking the shaft which is at present about 35 feet deep. Work is kept up night and day. The ore now being extracted is immensely rich in sulphurets, besides carrying free gold. The ore will, we are informed, be crushed in the Gold Cliff mill. New Frue concentrators will soon be erected at the mill by which process the sulphurets will be saved. The shaft will be sunk 100 feet before levels will be run.

## Fresno.

**SYCAMORE DISTRICT.**—Cor. Fresno Republican, April 14: The Sycamore district is situated about 50 miles from Fresno in an easterly direction, and is an inexhaustible field of mineral wealth. While it has not been even prospected yet, some good locations have been made and are being developed. The Stone Wall mine, belonging to James Musick, for the amount of development, bids fair to prove an extremely valuable property, with vein matter averaging from two to three feet. Assays of ore taken from their present workings indicate rich returns when the rock is milled. Immediately adjoining the Stone Wall is the American Flag, recently located by Kavanaugh & Hart. Pieces of float quartz found along the surface cropplings varying in size from 10 to 200 pounds show free gold in liberal quantities. The most extensively developed mine in the district is the Providence and Richmond Consolidated, perhaps better known as the Musick, and concerning which so much has already been said or written. The incline shaft formerly sunk to a depth of 75 feet on a continuous chute of \$30 to \$40 free gold ore, averaging in width from 18 to 30 inches, has, at a point about 20 feet deeper, encountered a five-foot vein showing an increased amount of gold in about the same proportion to the increased size of the vein. The lower level, intersecting the incline shaft at a distance of about 25 feet above the bottom, and thence running 90 or 100 feet in an easterly direction, has opened out into a three-foot vein of soft red ore interpersed with bunches of bright, lively, free, gold-bearing quartz, with every possible indication of a steady and rapid increase in size and quality of ore deposit. Aside from the property mentioned, and further eastward on the same mineral belt are several fine properties, especially on and near Dinkey mountain. During the month of October last, James Musick, a prospector, whose name as such is co-extensive with the Western States and Territories, while prospecting in the above vicinity, met with his usual good luck, discovering a mammoth gold-bearing ledge with surface diggings immediately below and contiguous

thereto. From pan prospects alone he realized \$1 per hour, but owing to the lateness of the season and the heavy fall of snow which occurred about that time he was compelled to abandon the claims until the coming spring, when he intends to resume operations. Considering the natural advantages to be found in this district as regards timber and water, in addition to its close proximity to railroad facilities, there is every assurance that the time is not far distant when Sycamore district must come to the front as one of the most prosperous mineral districts in California.

## Inyo.

**A GOOD MINE.**—Inyo Index, April 18: Mr. J. G. Birchum of Round valley is in town. He tells us that the Dark Horse mine, recently purchased by Mr. Wm. Charles for an English company, is developing splendidly—even better than was anticipated. At present 16 men are at work, but it is probable that 150 men will be put in the mine within a few months.

**SODA WORKS.**—Inyo Register, April 20: The Soda company has stopped the work of excavating vats on the shore of Owens lake, having a sufficient area cleared for present purposes. The enterprise has come to stay, nevertheless.

## Nevada.

**THE DRIFT MINES.**—Nevada Herald, April 21: Superintendent Richards of the Centennial drift mine is in town. He says the work of pumping out the mine is progressing rapidly. No caves seem to have occurred, and the mine will soon be ready for a full force of hands to drive into the channel. Mr. Richards says the item going the rounds that Pelton wheels are used at the Centennial, is wrong. The Richards wheel is what does the work there, and it does it successfully. At the San Jose they are still sinking, being down now about 235 feet. They have about 35 feet still to sink before they expect to reach the channel. It will be quite lively on that part of the ridge this summer, and if such ground is struck as is expected, there will be quite an excitement. There are good drift gravel mines on different parts of Washington ridge.

**FIRE-CLAY.**—Grass Valley Tidings, April 24: The very best fire-clay that can be had here by our foundrymen grows, the clay does, right in our town. Mr. Lakenan informs us that he has for years used in his foundry the clay that comes from the diggings of Reuben Thomas, in the northern part of town, and that this clay stands heat better than any other. And, therefore, could not fire-brick be made here of that same clay? The things of use that are right here among us are not yet half known. There does not seem to be good sense in importing here and paying freight on articles that grow here.

**WASHINGTON.**—Cor. Nevada Herald, April 18: We enjoyed a visit up the river last Saturday. Found Ole Hengerson's mill at the Daylight ledge in running order. It is a neat little four-stamp mill and is rigged up as complete as any of the large mills. The Yuba and Blue Bell are running full blast.

## San Bernardino.

**DAGGETT IRON ORE.**—Chino Valley Champion, April 20: Mr. W. E. Judson, the iron expert, made a call at Chino this week. He recently inspected the iron deposits at Daggett, and like a fair man with a reputation of value, he remained long enough to learn all that he could without practical development. He found a vast amount of ore of high quality, and is convinced it can now be utilized at a profit. His report that San Bernardino county contains immense quantities of iron ore, is one of value. The attention of iron manufacturers throughout the country has been called to the iron ores of San Bernardino county.

## Shaeta.

**SQUAW CREEK.**—Redding Free Press, April 21: L. Gross reports that the mines of Squaw creek are looking well. He says that Jack Conant has an abundance of rich ore in sight, and that he is working his mill and mine systematically.

**FRENCH GULCH.**—From P. Gleason, who has been employed in W. T. Coleman's mines in French gulch for the past eight months, we learn that things are booming there. In the Niagara, between 80 and 90 men are employed. There are about 30 men in the Shafter and Scorpion mines. The Merchant Prince is gradually absorbing the whole of the gulch, reaching over into Trinity county for a slice of Deadwood. From Geo. Swett, who came down from Squaw creek yesterday, we learn that the Riley & Bliss mine is employing between 20 and 30 men, and that their ten-stamp mill is in constant operation with satisfactory results.

## Sierra.

**RICH GRAVEL.**—Sierra Tribune, April 20: Thos. Carlett, who is mining in Tennessee ravine, near Poker Flat, recently encountered gravel which pays all the way from 50 cents to \$7 a pan. There is no denying the fact that Northern Sierra contains more rich deposits of gold in gravel than any other portion of this earth, and it is the opinion of the Tribune that the drift gravel mining industry is only in its infancy. The wealth is there, and eventually men who already possess capital will seek in the hills for more.

## Siskiyou.

**BLACK BEAR.**—Yreka Union, April 20: Mr. Pat Doran, who was in the city yesterday on his way to Shovel creek, Hot springs, informs us that the Black Bear mine is looking fine and that 16 stamps are running. He says that Mr. Daggett has just completed his narrow-gauge railroad from the mine to the mill, a distance of two miles. This dispenses with all teaming. Rock from the Mystery mine, owned by Daggett & Pierpont, is being crushed at the Black Bear mill and the amalgamator. Mr. English says it is yielding at least \$40 a ton. At the mine a 400-foot tunnel is being run which will tap the ledge at a depth of 80 feet.

## Trinity.

**NEW RIVER.**—Trinity Journal, April 21: Mr. J. W. Shuford was in from New River this week on his way to Trinity Center. He informed us that the camp is in a prosperous condition, and a great number of mining men are expected to take up their abode there this summer to aid in developing the mining industries of the camp. There are now about 4 miles of wagon-road in the district. The sawmill is doing good work, and all parties desiring good lumber can obtain the same at reasonable rates. The Excelsior, owned by Mr. Colgrove, is looking well and there is a large body of ore in sight.

The mine is good property. The Mountain Broomer has developed into a permanent mine, the ledge now being of good size and shows ore sufficient at least for two years' crushing. The Ridgeway is looking well, but very little work is being done at present; operations will begin in earnest soon. The Uncle Sam has been tapped at a depth of 170 feet by a tunnel, and all above this is good ore and will be stopped out during the summer, or as much thereof as can be handled. Hely's mine and Sherwood's are pleasing the owners, and will, without doubt, prove to be of considerable value within a short time. Nearly all the other mines are showing favorably, and work on them will be pushed this season. Roff & Hagena have discovered a good prospect and are getting ready to develop it into a mine, and have planned for building an arastra. New locations are filed frequently, which shows that there are many who have confidence in the richness of the quartz deposit, and that they are willing to wager money and their time that it will pay to work. No pack-trains have come into the camp this season, but they will soon run regularly, when the miners will be furnished with all things needed that are capable of being packed. The miners of New River district held a meeting recently to arrange for the employment of a physician and surgeon to reside there. It was agreed to levy a *per capita* tax of sufficient sum to give the physician a reasonable salary and accord him the privilege of practicing outside the camp.

**THE HARDCRABBLE.**—Trinity Journal, April 21: The owners of the Hardcrabble mine in the East Fork mining district are fast developing a good mine. A shaft is being sunk by contract and has reached a depth of 65 feet. The ledge at the surface is about an inch in thickness; at the bottom of the shaft it has widened to nine inches and is very rich in free gold, and carries extremely rich sulphurets. Mr. W. S. Lowden has recently surveyed it for a patent. The owners of the property are Messrs. Jas. Addie, and John Wallace and Dr. C. W. Spratt.

**KNOW-NOTHING CREEK.**—At present there is a scarcity of miners in camp; several more are wanted. The Hansen Mining Co. are still running a tunnel on their ledge and taking out considerable ore. The current rumor is that they will soon erect a mill. The Gold Run Co. are now working double shifts on their mine. Their mill is running steadily and they say everything is prosperous. The Know-Nothing Co. are still driving tunnels on their ledge and doing other development work; they expect to have a mill running by next fall. Clark & Dulybon are developing the Wolverine mine on Poverty creek; they say things look very promising.

## Tuolumne.

**GOOD ORE.**—Sonora Democrat, April 21: The Belcher mine, near Groveland, of which Mr. Louis Blanding is the manager, has developed a two-foot ledge of good ore. The Black Oak mine at Soulsbyville employs 60 men, the Gilson and Platt 16, and Soulsbyville is full of enthusiasm and brilliant hopes for a permanent welfare. The mine of Louis Stonicker and the Peferia Bros., near Tuttletown, is doing well; the ledge is from 2 to 25 feet in width and will average \$8 per ton. A company has taken hold of the Raymond & Gilson mine, near the Gilson and Platt lead. Mr. Pomeroy Easton has started up his five-stamp mill on ore from his mine at Arastaville. We are told that a considerable quantity of the rock already out will pay \$70 per ton. There is about 40 tons of that ore on the dump. The lead is not large, but it is of sufficient proportions to justify a larger mill. Messrs. Thos. H. Skaggs and E. F. McFarhan of Mormon creek have just discovered some very rich gravel in their claim on Table mountain. They had run a tunnel in the mountain through the gravel, and recently, in order to determine the extent thereof, they ran some drifts. The gravel strata are thought to be very extensive and prospect richly. There are many mining men in Sonora at present looking at properties in this county. We are having a kind of a mining boom here, and now is the time for all parties who have mining properties of real, substantial merit to develop them, for capital and energy would soon be attracted to them. Mr. P. W. Scott has resigned his position as superintendent of the Black Oak mine, and the company has appointed William Sharwood, mining engineer, to the superintendency thereof.

**EAGLE.**—Tuolumne Independent, April 21: At the Eagle mine, 14 miles east of Columbia, on Eagle creek, the owners have developed a very fine piece of property. The tunnel is in about 250 feet; and 160 feet below the surface, on the pitch of the vein, the rock is extremely rich. A three-foot vein has been uncovered, the rock prospecting in the neighborhood of \$30 a ton.

**BONANZA.**—In round numbers, \$30,000 has been taken out of the pocket struck in the Bonanza mine about three weeks ago, and has been sent below. There is two or three tons of refuse now being worked at Ferguson's mill, at the water works. Besides this, there is a lot of waste rock, sand and siftings to be worked up, which will doubtless bring the total yield of this pocket close on to \$37,000. This strike was made on the footwall, some 150 feet from the surface, and a short distance, on the same wall, from the \$60,000 pocket taken out about a year ago. The big strike of several years ago was on the hanging-wall—the two walls being separated by about six feet of debris, slate, etc. It is hoped to strike another pocket soon, as the indications point to another deposit a few feet further on from where the present ore was found. And so it is being proved, day by day, that the mining industry of this county is yet in its infancy.

## NEVADA.

## Wahoe District.

**BULLION.**—Virginia Enterprise, April 21: Opened a station on the 640 level and have commenced crosscutting east.

**CROWN POINT.**—The upraise from the east crosscut on the 500 level to connect with the 400 winze is up 32 feet. Work in the east crosscut has been suspended until this connection is made. The south drift on the 600 level was advanced 20 feet; total length, 451 feet. The west crosscut was advanced 30 feet; total length, 140 feet. The face shows some quartz, giving low assays. The Suro tunnel drift has been stopped, and connection will be made with it from the Suro tunnel side.

**SAVAGE.**—On the 400 level the south drift has been advanced 22 feet and continues in ore that

averages, by assay, \$30 a ton. The southeast crosscut from this drift has been extended 34 feet, making its total distance 74 feet. Are extracting ore from the several levels between the 400 and 900 stations, and are shipping to the Rock Point mill about 70 tons per day, the battery samples of which average \$31 per ton. Have bullion on hand amounting to \$22,000.

**BEST AND BELCHER.**—On the 425 level upraise No. 2, near the north line, has been carried up 10 feet. At the top of this raise have cut out a station and started a west crosscut. The formation is quartz and porphyry. The winze at a point 50 feet south of upraise No. 2 has been sunk 24 feet; total, 40 feet. The formation is quartz, showing some value by assay.

**CHALLENGE.**—The joint Challenge and Yellow Jacket north drift on the 1000 level was run during the week 41 feet; total distance, 272 feet. This drift is now connected with the Confidence Challenge raise. By this connection good ventilation is obtained for the Confidence and Challenge mines on the 1000 level.

**CONFIDENCE.**—The winze is now down a distance of 32 feet, having been sunk 12 feet during the week. The bottom shows fair ore. We are now shipping daily to the Brunswick mill for reduction 180 tons of ore, the average battery samples of which show a value of \$42.70 per ton.

**HALE AND NORCROSS.**—From the 600 and 700 levels are extracting the usual amount of good ore. During the week have hoisted 1587 tons, and have shipped to the Nevada and Mexican mills 1505 tons. Have bullion on hand and previously shipped this month amounting to \$70,000.

**OCCIDENTAL.**—In the lower tunnel, 75 feet south of the north incline winze, the incline upraise has been carried up 10 feet; total 35, and 15 feet south of the north incline winze. The south drift has been carried 4 feet; total, 72. Extracted 28 tons of fair-grade milling ore.

**KEYES.**—The south drift on the 240 level has cut through a laminated clay 5 feet thick and course has been altered so as to crosscut the vein. Face now in soft vein porphyry showing some metal.

**ANDES.**—Have just started drifting east on the 350 level. The face is in quartz. Are still drifting north on the 240 level in low-grade ore, with occasional spots of rich stuff.

**GOULD AND CURRY.**—Have extracted during the week 100 tons of ore from the 250 and 300 levels of fair-grade milling quality, which has been stored in drifts to the mine.

**CHOLLAR.**—The main incline from the Chollar shaft is down to the Suro tunnel level. North drift No. 2 on the 450 level is in 471 feet in low-grade quartz now.

**POTOSI.**—The south drift on the 550 level is in 426 feet in quartz and clay now. The southwest drift on the 450 level is in 315 feet in clay and porphyry.

**SEGREGATED BELCHER.**—The south drift on the 1300 level being in bad condition, we are now engaged jointly with the Belcher Co. in thoroughly repairing it.

**ALPHA.**—The north lateral drift on the 382 level is in 178 feet, and the winze 100 feet from the Alpha shaft on the 382 level is down 50 feet.

**UTAH.**—The west crosscut from the top of the upraise has been extended 45 feet; total, 90. The formation is quartz, showing valuable assays.

**YELLOW JACKET.**—There is a west crosscut started on the 1100 level, near the north line, which is showing ore of good value.

**IOWA.**—Have put in and repaired 450 feet of water-pipe from the flume down to the McBee tunnel.

**WEST CON. CAL.-VA.**—Sinking shaft and passing through mineralized vein quartz.

**OVERMAN.**—Shipping 40 tons of ore daily to the Vivian mill. It is of fair grade.

**ALTA.**—Mill running steadily on ore from the 1150 and 825 levels.

**BALTIMORE.**—Are still at work putting in the new pump.

## Cory District.

**ARASTRA.**—Esmeralda News, April 21: Tobe Crossman will start up his arastra in a few days. He has 20 tons of \$50 ore on the dumps of the Gertie, Ollie and Golden Eagle mines, that he intends running through it. The mines and arastra are situated in Cory mining district, about a mile above the town of Coryville. Men will be put to work on the mines within a few days to take out the ore that is now in sight and to further develop them. Tobe expects to keep his mill, which can crush about three tons per day, at work all summer.

## Ely District.

**ELY.**—White Pine News, April 21: The Ely Gold Mining and Milling Co. shipped this week three bars of gold bullion, valued at \$2485. This amount was produced from 212 tons of ore, an average of about \$11.40 per ton. The amount being lost in the tailings is said to reach \$75. We hope the company will be able to save the greater part of this loss after thorough experimenting. If they can, they have a good property.

## Eureka District.

**ORE SHIPMENTS.**—Sentinel, April 21: During the past week ore shipments were made from the mines of the district as follows: To the Eureka Con. Reduction Works—Margueretta mine, 13 tons; Summit, 12 tons; Altoona, 5 tons; Dunderberg, 40 tons; Geddes & Bertrand, 10 tons; Standberg, 16 tons; Silverado, 1 ton; Williams, 11 tons; Richmond Works—Lincoln, 16 tons; Dunderberg, 41 tons; Geddes & Bertrand, 18 tons; Jackson, 52 tons; Williamsburg, 6 tons; May Lode, 12 tons; Idaho, 11 tons, and El Dorado, 5 tons.

**THE SILVER CONNOR.**—Our reporter accompanied Wm. Stowell to the Silver Connor mine last Sunday to see the development in the tunnel that has been driven into the hill below the hoisting works. There is quite a lot of ore broken down and set out on the dump, probably 60 tons. The tunnel has cut through the ore body for a distance of 20 feet, and the raise to the old works is completed. The connection will greatly facilitate and cheapen the development of the mine. An examination of the old works from the surface down to the point of connection showed a large amount of ore in sight that can be easily extracted. The owners will probably commence shipping ore to the furnaces in a



few days, as it comes out so rapidly, with even the small force of three men that are at present employed, that there will be no room on the dump to store it. Several hundred tons have been stowed out from the old works just above the tunnel level, and there is now as much or more ore in sight.

#### Garfield District.

**THE IDA.**—Esmeralda News, April 21: The indebtedness of the Ida mine, Garfield district, has been settled, and Mr. Fish of Dayton, one of the principal owners in the mine, has been in this section during the past week, making all necessary arrangements for the resumption of operations. The mine has already produced \$15,000 in bullion and has a quantity of good ore in sight.

#### Hawthorne District.

**EARLY DAWN.**—Esmeralda News, April 21: C. B. Kimball and Charley Ganong, the owners of the Early Dawn mine, are highly elated over the discoveries made in their mine during the past week. Mr. Ganong brought a sample of the ore from the mine into town this week. It is as nice a specimen as has ever been brought in from the district. From men who visited the mine last Wednesday and who had examined the ore, it is claimed that it will go away up in the hundreds.

**GOOD PROSPECTS.**—Syl Light is working steadily on his mine. He has been at work on the claim but a short time and has now nine sacks of galena ore on the dump that he expects will work from \$75 to \$100 per ton.

#### Jefferson District.

**SILVER.**—Belmont Courier, April 21: Charles Kanrehat and the Nelson brothers have made their first shipment of silver bullion from Jefferson. Their mill is running steadily.

#### Patterson District.

**MOVING A MILL.**—Pioche Record, April 14: The 10-stamp quartz mill at Silver Park district, owned by Chandler & Comins, is being removed to Patterson district. Teams from White river are hauling it and expect to have it delivered during this month. It will be used to work ore from Ed L. Robertson & Co.'s mines. Salt Lake parties are furnishing capital for the enterprise.

#### Robinson District.

**THE KEYSTONE.**—Eureka Sentinel, April 21: H. Featherstone and J. B. Reynolds came over from Robinson district last Sunday, and the former on the following day left for Cortez to see Mr. Clark at that place in reference to the erection of a small leaching-mill, which they propose to erect at the Keystone mine. The mine is looking very well, having about 2000 tons of ore in sight that will average over \$40. The plant they are figuring on is one of from five to ten tons per day capacity, and they intend to build it as soon as their plans are completed.

#### Spanish Belt District.

**BARCELONA.**—Belmont Courier, April 21: The Barcelona mine never looked better than it does at present. All the stopes are showing fine ore, and the Monitor-Belmont mill ought to make a profitable run this summer. The concentrators, which arrived at Austin last week, are on their way to the belt. They will be put in working order as early as possible after their arrival and started up concentrating the low-grade ores of the Barcelona. The concentrations will be shipped for treatment.

#### Tuscarora District.

**BELLE ISLE.**—Times-Review, April 20: The stopes continue to yield their usual amount of ore.

**COMMONWEALTH.**—100-foot level: South drift has been extended from the station 23 feet; face is in clay, carrying seams and bunches of ore assaying \$79 to \$340. The south intermediate drift has been extended 15 feet, the ore being very high grade. North drift from bottom of winze the ore has improved and looking better than at last report. It has been extended 11 feet, which gives an opening on this ore body of 108 feet from face of south intermediate to the north end of opening, and still looks well for continuing.

**NEVADA QUEEN.**—Upraise being put up to connect with the winze from 200-foot level has been extended up to feet; total, 58 feet. The face is still in good ore, but does not show quite so well as when last reported. This raise is being carried up on the footwall side and only takes part of the ore, there being fine ore overhead all the way down to the 350-foot level.

**GRAND PRIZE.**—West crosscut, 200-foot level, extended 33 feet. Have passed through strata of rich ore during the week. Upraise above the 300-foot level slopes up 30 feet, and work stopped until the 200-foot level south drift can be extended to connect with the same for ventilation; the top of the raise being still in good ore.

**PUNDERE.**—East ledge end of crosscut has been advanced 7 feet; total, 28 feet. Ledge is not as hard as heretofore. There is one foot of ore which is improving as we go north. The face of this drift is all in quartz with bunches of sulphure ore.

**NAVAJO QUEEN.**—North drift from east crosscut, 200-foot level, advanced 15 feet; ledge is looking very well, showing seams of sulphure and quartz in the face.

**FOUND TREASURE.**—Upraise No. 2 has been extended 10 feet. Upraise No. 3 has been carried up 10 feet. The faces of both raises are in high-grade ore.

**NAVAJO.**—South drift from east crosscut No. 4, same level, extended 8 feet; the face looks favorable. The stopes continue as at last report.

**NORTH BELLE ISLE.**—The usual quantity of ore has been sent to the mill and dumps. Everything about mine and mill is running smoothly.

#### ARIZONA.

**CHERRY DISTRICT.**—Prescott Courier, April 17: The Mammoth, owned by Jas. Allen, is opened by three shafts, the deepest of which is 80 feet. Ledge is five feet thick. Averages between \$12 and \$15 a ton gold. Formation granite. The Joe Wheatley lode, belonging to James and John G. Allen, is four feet wide at the bottom of a 60-foot shaft. Average assay of the ore \$20, gold. Assorted ore has paid well in an arastra. Richard DeKuhn is opening what his neighbors say is a grand ledge. The McWhorter is a strong vein. It is opened by shaft. McDermid and Linn are developing mines for Prescott parties. Yank Smith is crushing ore from his ledge in an arastra. Mr. Boyer is making money

by grinding his ore in arastra. Tom Goodwin is in same business. So are Thompson & Denny. East of these mines is the Etta, one of the best gold mines in Arizona. West are the United Verde copper mines. The district is about 30 miles east of Prescott and near Verde river and valley; is well timbered and watered; has an excellent climate.

**WEAVER.**—Kerr mill being put up. Plenty of ore ready for it. Mr. Cockburn says he is shipping two carloads of ore each day from his sampling works. David Grubb, who owns two of the best mines—one gold and the other silver—in Hassayampa district, went to his camp yesterday. Four fine quartz wagons, built by Schutler for the Etta Co., have arrived from Chicago and will be taken to the mine. They are of the narrow track persuasion. Fine concentrators and other machinery have come from Chicago for A. L. Kerr & Co. of Weaver district. A dozen or more prospectors left town yesterday for the mountains in quest of veins of the precious metals.

**WALKER DISTRICT.**—Moore & Doggett, owners of the Amulet mine, are hoisting about five tons of silver ore a day. It samples from 350 to 450 ounces per ton. Carmichael Bros. are opening a very large gold vein. Their mill is running. Other mine-owners are at work. Placer miners of the district are saving from \$200 to \$500 a day, gold.

**HASSAYAMPA.**—Dan O'Boyle taking gold out of the Montgomery mine. Oro Fino Hydraulic Company just made another big cleanup. Silver Trail mine producing good ore. So are mines belonging to Smith & Bigelow, Brown & Dunlap, Harlan & Barrington and others. Preparations being made for working of the Senator.

**BRADSHAW.**—About 60 miners at work opening rich properties. Moody, Place & Co. getting ready to mill. Oro Bella Co. has fine veins.

**BIG BUG DISTRICT.**—Boggs is timbering and drifting. Van Name putting up quartz-mill. Roberson & Foster piling up rich ore.

**TIP TOP.**—Heavy shipments of rich silver ore. One 20-ton shipment from the Tip Top mine.

#### COLORADO.

**COMPROMISED.**—Elk Mountain Pilot, April 18: It is said that Messrs. Hawkes and Taylor have compromised their difficulties and that great things may be looked for on the Ruby Chief group this season. The amount of low-grade milling ore in sight is unlimited, and with the late improved methods of concentration introduced by Matt Nichols we are confident that large profits may be derived from working this property. Work has been commenced on the Little Gerie lode, in Elk basin, by Isaiah Harley.

**CO-OPERATION.**—For the past year a party of coal miners have been prospecting for coal about six miles south of town in the mountain ridge separating Slate river from the waters of Ohio creek. It is a co-operative company made up of eight miners here in town, who have the right to acquire 160 acres apiece, a part of whom work and the rest furnish the means to keep their fellow-workmen supplied. It was their object and belief that they would develop the C. C. & I. coking coal vein, which has been prospected for a number of years. From the broken and upheaved condition of the mountains it is not at all unlikely that just as good coking coal can be found there as is mined from the C. C. & I. mine. The boys had a good outcrop where they have made their opening, showing coal measures to exist on the surface, but as yet they have been unable to find the vein in place. They are still working it vigorously.

#### IDAHO.

**GOLD ON THE SOUTH FORK.**—Wardner News, April 17: An important mining deal was perfected on last Wednesday evening whereby Jim Wardner obtained a conditional interest in the gold locations on Elk creek known as the Minnie, Vernie, Nelly Wood and Allafretta. These mines, owned by Jack Curry, Charles Manly, O. A. Brown, J. Johnson, Andy Evans and Thomas Wall, are about 1½ miles from Wardner. Of late they have attracted considerable attention, and all well-informed mining men who have seen them unhesitatingly pronounce them the most promising gold locations yet discovered in Coeur d'Alene. Jim Wardner, who has had an extensive and varied experience in mining matters, has made a conditional contract with the owners, whereby development on a more extensive scale will be commenced on all of the locations immediately. He has agreed to do \$1400 worth of work, and on completion of same, if satisfied with the result, will erect a 20-stamp mill on the ground which he agrees to have in running order by the 15th of next July. The accomplishment of this work will give him a large interest in the property. The discovery and working of rich gold mines on the South Fork will add another great feature to the vast resources of this unequalled mining region.

**A BELT OF RICH VEINS.**—Wardner News, April 19: Commencing at a point near Big creek there seems to be a belt of veins bearing high-grade copper ore, which extends easterly back of Bill Osborn's ranch as far as the Argentine mine, making a distance of about three miles. On this belt are several very promising locations, consisting of the Polaris, Captain Horton's claim, Bill Osborn's and the Argentine. Several other locations have been made, but as yet the developments are not sufficient to show their value. W. B. Heyburn and Harry Dennis are carrying on the development of the Polaris mine with a force of several men, and now have a tunnel in on the ledge 400 feet and a shaft running from the tunnel 100 feet deep, all of which show high-grade gray copper ore averaging from \$700 to \$1000 per ton. The bottom of the shaft is now in a ledge about five feet wide, showing nearly a foot of gray copper. They are now proposing to construct a wagon-road from the mine to the mouth of Big creek and will then begin shipping ore.

**DEER CREEK PLACERS.**—Coeur d'Alene Record, April 14: John Cumerli's placer mining in the St. Regis country has been carried on so quietly that very few are aware what proportions the business is assuming. Mr. Cumerli's expense account for his Deer creek work is already upward of \$12,000, and the work laid out for this season will swell the figures up nearly, if not quite, to \$30,000, and possibly more. There are 15 claims embraced in the field covered by his operations. All the work done

up to this time, and all that will be done for some time to come, is preparatory to getting extensive hydraulic works in operation, and no returns are expected at present from this large investment of capital. Surveys will soon be made, and patents applied for. A sawmill is being erected, and everything is being done after the usual practical and judicious methods which characterize all of Mr. Cumerli's operations.

**THE HENRIETTA MINE.** Wagon town, is improving in richness as work progresses. We were shown, a day or so since, by H. S. Howe, superintendent, several specimens of ore taken from the lower level and the winze now being sunk, that were unusually rich. In fact, they seemed to be half silver. The lode is about three feet wide, and is growing richer as depth is attained. There is now no doubt that Mineral Hill, as the hill is called where the Henrietta mine is located, contains a large deposit of very rich ore, which Supt. Howe says he will find for the Prouette Co. The Henrietta never looked better.

#### MONTANA.

**CASTLE DISTRICT.**—Castle News, April 21: A new shaft was commenced on the American Tuesday. Ore is being taken out from the start and of better quality even than that found in the tunnel. A fine body of ore has been struck on the Cape Horn in the Smith district. A lead of four feet was opened up Saturday, making a magnificent showing. L. Hensley brought in a piece of float yesterday from a location situated between the Chollar and American. It is a fine piece of gray carbonate assaying 291 ounces. Smith Bros. have shown their unbounded faith in their mines from the first. They have expended about \$2500 in improvements and are realizing their expectations. These gentlemen have extensive placer mines in Thompson gulch also. We visited the Powderly Saturday. A tunnel is run 120 feet where it opened into a cave of the lead showing 3½ feet breast 73 feet below surface. The owners are greatly elated over their strike, as they have cause to be. The Black Hawk has a shaft now 90 feet and not yet through the iron ore which extends the whole distance from the surface to the bottom of the shaft. Neither wall is yet found of this immense body and which is pronounced by experts the best fluxing they ever saw. The Cumberland Co. have the new shaft down 150 feet and are crosscutting from the new to the old shaft to get air for working the new one. A crosscut is also being made at the 18-foot level and through an excellent ore body. A force of men and teams is making a road from the mine to the county road preparatory to freighting away the ore.

#### NEW MEXICO.

**ORGAN MINES.**—Rio Grande Republican, April 14: Concentrating works are still demanded at Organ. John B. Thompson is working the Crescent City. Clark and Brown are driving a tunnel on the Black Prince. G. W. Heavis is at work on the Antimonial with Hufford Bros. A. A. McLaughlin is at work on the Tougnot, and it is producing some very good ore. Lew Cowan and Buck Akes have a handsome prospect on the Silver Star, adjoining the Little Buck. It is high-grade ore. Sam Hughes and Hoskins are delving into the bowels of the earth on the Little Buck, and some first-class ore is rewarding their labor. The shipment of 10 tons of ore from the Grey Eagle netted \$1010, the first-class ore running 227 ounces in silver and 70 per cent lead, and the second class 60 ounces silver. The ore was milled at Pueblo. The Jay Gould is owned by Elijah Davis, Jim Robinson and Billy Hayden. They have started to do some work on the property. It at one time yielded the copper-silver ore on which the smelter ran. Returns were received from a mill-run made from ore shipped from the Ben Nevits this week, which show that it is one of the best mines Organ has produced. The returns from two classes of ore gave, first-class, 74 ounces silver; second class, 46 ounces silver and 8-10 of an ounce gold. The vein has been crosscut 12 feet and no wall has been reached. Any other camp in the Territory, with the same prospects that are found in Organ, would have been developed to a great depth, but little deep mining has been done. It is a significant fact that the Memphis and the Bennett, where the only depth has been attained, found excellent ore. Organ needs capital, and it would be well invested.

**MILL.**—Silver City Enterprise, April 21: Captain Davis' 5-stamp mill at Pinos Altos is running regularly on ore from the Aztec mine. H. H. Betts and Fred Sheldon have sent timber to the Peleg at Cow springs and will begin work. Seven carloads of ore were shipped from Silver City Wednesday, including one of Mountain Key concentrates. D. B. O'Brien has leased one of W. H. Newcomb's claims just southwest of town and is shipping iron ore to the Billings smelter. The sinking of the shaft on the Golden Giant is progressing as rapidly as possible. The mine is making a splendid showing. Captain Cooney's new mill on Silver creek, in the Mogollons, is working perfectly, and the captain will soon have a nice lot of bullion to ship. The Alhambra, at Black Hawk, has seven or eight tons of ore on the dump worth \$700 per ton. The owners will probably make another shipment soon. Last month \$30,000 in silver bullion and \$14,000 in dust and gold bullion were shipped from this city. This does not include the concentrates or ore shipped.

**HERMOSA.**—Black Range, April 13: The one, I not the brightest mining camp in the Territory, is Hermosa, situated in Sierra county between the towns of Hillsborough and Chloride. This camp is one of the few self-sustaining camps in our mining world. For years have the mines of Hermosa been worked and developed by their owners, whose only capital was muscle and courage, and who for their enterprise and courage have been liberally rewarded. To-day many of the pioneer miners and prospectors have surrendered their rights to capitalists who are fast taking possession of the mines of the camp, and in turn are very jubilant over the prospects before them, and lively times are anticipated here this summer.

**TOTAL PRODUCT FOR 1887.**—The total product of bullion and mineral for the past year of the county of Socorro from all sources amounts to \$2,816,079.13, an increase over 1886 of \$183,945.72. The product during the current year will now, we are certain, reach over \$3,000,000. This is a striking result when

we reflect that in 1880 the county of Socorro did not realize one dollar from its mines or mechanical industries. We would be unjust, however, were we not to add that the ore from which it was secured was drawn from the other camps of New Mexico and Arizona, as well as from those situated in Socorro county.

**HERMOSA.**—Cor. Socorro Bulletin, April 7: The Hermosa concentrator is working continually and successfully on second-class ores produced from the various mines heretofore. The producing mines in camp now working are as follows: The Antelope, Ocean Wave, Longfellow, Homestake, Pelican, Vulture, Albatross, Eagle, Palomas Chief, Embolus, Happy Anna, Atlantic Cable, Argonaut, Ell. Humming Bird, which is a fine producer of high-grade mineral is at present idle pending a sale. The American Flag is also a fine piece of property and has produced considerable high-grade ore, but is idle at present. It is owned by Eastern parties, and were it owned by parties in camp, it would be as vigorously worked as the other good mines of the camp, that are owned by men without capital only what they take out of the ground.

#### OREGON.

**THE CRACKER CREEK MINES.**—Bedrock Democrat, April 10: The Democrat office received a call yesterday morning from Mr. J. W. Gray, one of the owners of the Silver King mining property on Cracker creek, about 35 miles northwest of Baker City, which mining section has already been made famous from the extraordinary rich showing made by the Eureka, owned by Messrs. Knowles & Bourne, Portland capitalists. Mr. Gray informs us that a force of seven men has been at work on the property all winter and the result of operations is a tunnel 140 feet in length and another upward of 80 feet in length, opening up a vein of ore six feet in width, a sample of the ore now lying on our table yielding an assay of \$165 to the ton. The owners of the Silver King are greatly encouraged by the result of their winter's work and are confident that they have a bonanza. Cabell Bros. have worked all winter on their extension of the Eureka, and an assay from a strike made in their ore body about 10 days since yielded returns of the enormous sum of \$13,880. In fact, the ore found was simply a body of rich specimens. The vein is large and all indications point to one of the richest discoveries ever made in Baker county. West of the Cabell Bros. property, Messrs. Ridgeway & Taft and four other companies are doing extensive development work with the most encouraging prospects. The Cracker creek district is proving itself to be wonderfully rich in mineral deposits, and before the summer is over a large amount of capital will be introduced there and mills for the reduction of the ore is almost an assured fact.

**BAKER CITY.**—Bedrock Democrat, April 16: The outlook for Baker City to-day as a mining market in which there will figure heavy sales of properties this season, is more favorable than at any time during her past history. The fact has gone abroad that within a radius of 100 miles she counts her paying mines by the thousands, and the same has been certified to in such a way that the capitalist who wishes to invest his money in mines is fully assured that to purchase property in this section is not to risk his capital on a mere experimental basis. To enumerate the titles of our now fairly known mining districts would require more space than can be accorded in an article like this; to mention by name one-fourth, even, of the paying properties being actively operated in these districts is impossible, but scarcely a day passes in which the Democrat is not called upon to record a rich strike here and a new discovery there, thus heralding to the outside public the story of an Ophir that will some day make the name of Oregon familiar with the stock markets of the world.

**FROM GRANITE.**—Bedrock Democrat, April 16: Our reporter was yesterday shown a letter from Ike Klopp, who is largely interested in mining properties on Onion creek, this county, and judging from its tone, the boys in that section are jubilant. Of his property on Onion creek, eight miles from Granite creek, Mr. Klopp says the ore in the middle tunnel has a width of 18 inches and they have not yet reached the hanging-wall. This letter also mentions a new strike being recently made in the Cabell mine, which is pronounced rich, and further states that Garrison & Co. are taking out very fine ore from the tunnel in their mine. Mr. Klopp expects to shortly commence operating his gravel mines on Onion creek. Water is abundant and a good season is anticipated. The letter speaks in glowing terms of the general features of the entire camp, and represents the miners as being in a more hopeful mood than ever before.

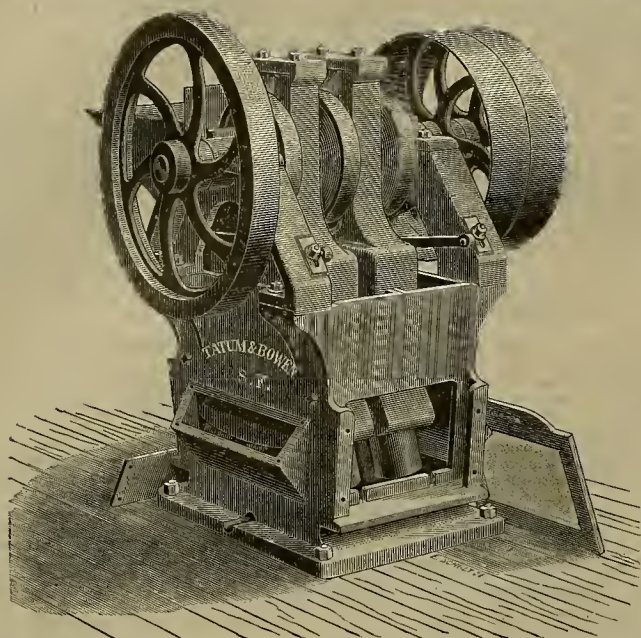
#### UTAH.

**REVIEW.**—Salt Lake Tribune, April 20: The receipts in this city for the week ending April 18th, inclusive, were \$139,339.82 in value in the aggregate, of which \$75,438.85 was ore and \$63,900.97 was bullion. For the previous week the receipts were \$57,666.29 in ore and \$17,849 in bullion; a total of \$75,515.29. The Ontario's output for the week was 26 bars of bullion, 16,737 fine ounces, and \$25,890.13 in ore sales—an approximate total of \$42,627.13. The Daly product for the week was seven bars of bullion, 10,289.28 fine ounces. It is understood to be making shipments of ore from time to time. Fine bar receipts in this city for the week were to the value of \$35,274. The Hanauer smelter produced during the week, bullion valued at \$14,530; the Germania, \$14,096.97. Ore receipts here for the week were to the value of \$44,131.12 by Wells, Fargo & Co.; \$16,000 by McCormick & Co., and \$15,307.73 by T. R. Jones & Co.

**ORE AND BULLION SHIPMENTS.**—Park Record, April 21: The Crescent has made no shipment of ore the past week on account of the sampler being shut down for repairs on the boilers. The following lots of ore were shipped from the Mackintosh sampler since the first of the month: Ontario, 1,120,000 pounds; Daly, 338,180 pounds; Sampson, first-class, 40,880; second-class, 252,200 pounds. On Wednesday the Ontario shipped 26 bars of bullion, containing 15,063 fine ounces of silver. Last Sunday the Marsac mill shipped 7 bars of bullion, containing 8231 fine ounces of silver, and yesterday 7 bars more were shipped, containing 7995 fine silver ounces.



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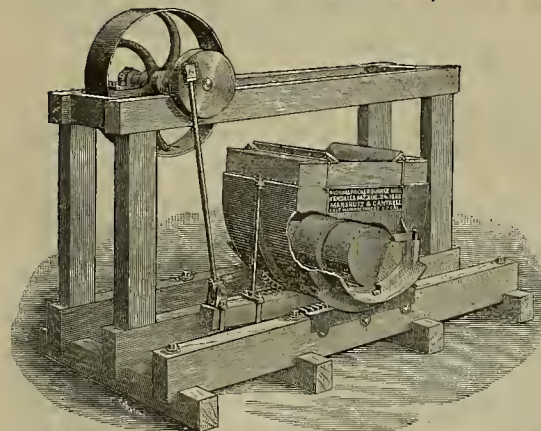
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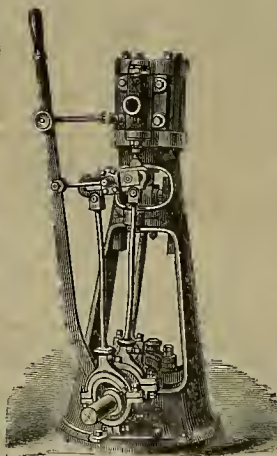
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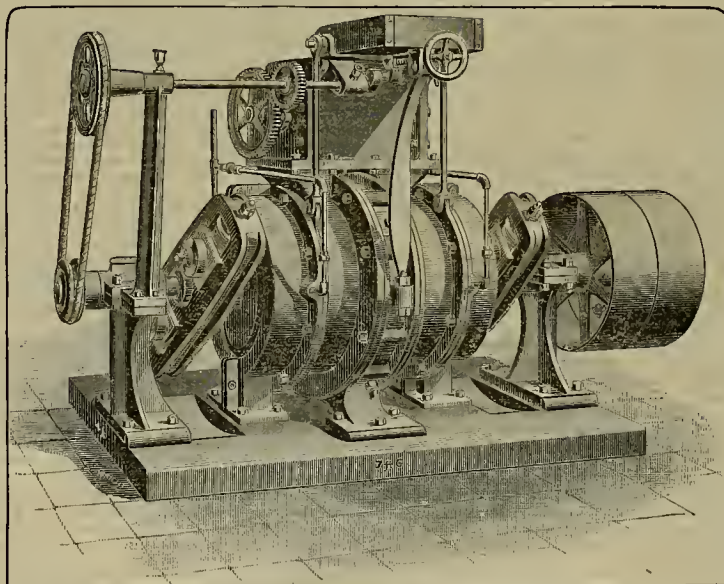
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application.

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G. DENNISTON'S Silver Plated Amalgam Plates. The  
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C. A. LUCKHARDT, Manager.

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Ores worked by any Process.

Ores Sampled.

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Working Tests (practical) Made.

Plans and Specifications furnished for the  
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Special attention paid to Examinations of  
Mines; Plans and Reports furnished.

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These Wheels are designed for all purposes where limited quantities of water and high heads are utilized, and are guaranteed to give more power with less water than any other wheel made. Being placed on horizontal shaft, the power is transmitted direct to shafting by belts, dispensing with gearing.

Estimates furnished on application for wheels specially built and adapted in capacity to suit any particular case.

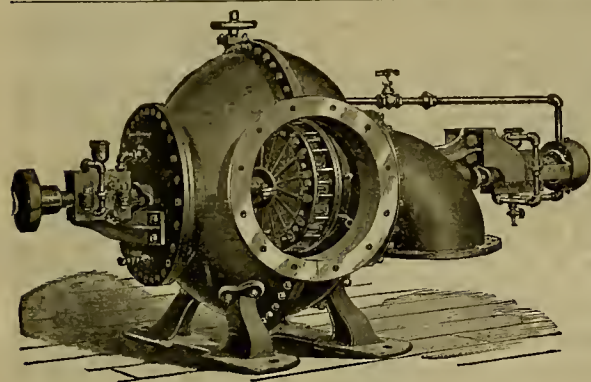
Further information can be obtained of this form of construction, as well as the ordinary Vertical Turbines for Wooden Penstocks and in Iron Ovals Cases, free of cost, by applying to the manufacturers.

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## PNEUMATIC PULVERIZER.

The principle of pulverization consists in the employment of two

### POWERFUL OPPOSING CURRENTS

Of dry super-heated steam, so arranged that they continuously charge themselves with crushed or granulated material, and by the great force and velocity of the steam currents the minerals are dashed against each other with such power of concussion as to cause the hardest ores to be pulverized to any degree of fineness desired. The high temperature of the super-heated steam currents employed, through which every minute particle of ore must pass, causes them to become very hot and dry, which produces a beneficial effect upon Sulphurets and ores containing rusty Gold. The light weight and simplicity of construction of this Pulverizer, its extremely small and inexpensive wearing parts, are the WONDER and SURPRISE of all who witness its operation. The Company is prepared to furnish complete plants for pulverizing

10 TO 200 TONS PER DAY,

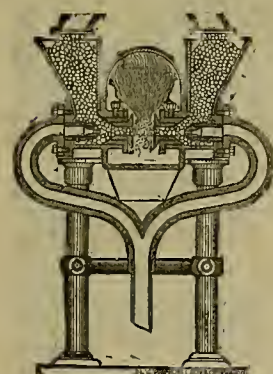
Including a Sectional Steam Boiler supplying all the power required.

**PNEUMATIC PULVERIZER COMPANY,**

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Write for Particulars.

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Sectional View of Pulverizer.

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FOR SEVENTY-FIVE DOLLARS THIS  
College instructs in Shorthand, Type Writing, Book-  
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SEND FOR CIRCULAR.

E. P. HEALD, President.

C. S. HALEY, Secretary.

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Laundry Free for the use of Families  
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ROOMS WITH OR WITHOUT BOARD.

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Are you going to make any change in machinery? Do you want Pulleys on Shafting already  
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THE DODGE PATENT INDEPENDENCE

**WOOD SEPARABLE OR SPLIT PULLEYS.**

They are the Lightest, Strongest, Best Balanced and

**Most Convenient Pulleys Made in the World.**  
Entirely new and original. Adapted to any power required. Time, trouble and money saved by using these pulleys.

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**BULLION ROOMS and ORE FLOORS,**  
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COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed  
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING APRIL 17, 1888.

381,321.—APPARATUS FOR REDUCING BITUMINOUS ROCK—G. E. Belmor, S. F.

381,323.—GASLIGHT SHIELD—Annie L. Boone, S. F.

381,117.—PRINTERS' GALLEY—O. A. Dearing, S. F.

381,362.—WASHING MACHINE—O. J. Graham, Spokane Falls, W. T.

381,364.—DENTAL PLUGGER—B. W. Haines, S. F.

381,365.—WIRE-ROPE MACHINE—A. S. Hallidie, S. F.

381,470.—OVEN ATTACHMENT—C. H. Harmon, Lebanon, Ogn.

381,369.—FILTER PRESS—A. Heberer, Alameda, Cal.

381,225.—WHIFFLETREE—D. R. Lakin, Eugene City, Ogn.

381,257.—DREDGER DIPPER—M. C. Lawton, Staten Island, Cal.

381,258.—DREDGER DIPPER—M. C. Lawton, Staten Island, Cal.

381,399.—HAME—A. C. Matlack, Independence, Cal.

381,155.—PAPER AND TWINE HOLDER—J. G. McBride, S. F.

381,267.—THRILL COUPLING—A. F. Moltzen, Oakland, Cal.

381,268.—SASH HOLDER—F. B. Moors, S. F.

381,414.—CLOTHES STAND—S. A. Parker, San Jose, Cal.

381,286.—PADDLE BELT FOR PROPELLERS—W. H. Silsby, Martin's Ferry, Cal.

381,455.—APRON FOR CONCENTRATORS—G. E. Woodbury, S. F.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SASH HOLDER.—Frank B. Moore, S. F. No. 381,268. Dated April 17, 1888. This invention relates to devices which may be used to fasten windows and prevent their being opened when in one position, and when reversed will act as a catch to hold the sash at any point where it is desired to have it remain when raised.

THRILL COUPLING.—Aug. F. Moltzen, Oakland, No. 381,267. Dated April 17, 1888. This thrill-coupling consists in the adjustable yoke or hearing-plate to be secured to the axle, the pivoted latch on the shaft-iron for connecting said shaft with the hearing-plate, the spring for holding the latch to its seat and preventing rattling, and the thumb-lever for lifting the latch from its seat in order to release the shaft-iron.

DREDGER DIPPER.—M. C. Lawton, Staten Island, San Joaquin Co. No. 381,258. Dated April 17, 1888. This invention relates to that class of dredger-dippers or buckets commonly known as the "clam shell," and which employ two oppositely pivoted jaws with mechanism for forcing them together and releasing them. The invention consists, in connection with the jaws of crossing links, sliding cross-heads and a sliding or varying connection between the links and cross-heads. The object is to increase the power in closing the jaws.

DREDGER DIPPER.—Manley C. Lawton, Staten Island, San Joaquin Co. No. 381,257. Dated April 17, 1888. This dipper is of the clam-shell type. The invention consists, in connection with the jaws of the dipper, of the crossing links by which they are operated, and the sliding cross-heads to which the upper ends of the links are pivoted. The object is to provide a construction by which a much greater leverage may be obtained to increase the power of the jaws in closing, so that said dippers may be used in harder material than they have heretofore been found adapted for.

WIRE ROPE-MAKING MACHINE.—A. S. Hallidie, S. F. No. 381,365. Dated April 17, 1888. This improvement in wire-rope making machines consists of a horizontal rotating frame within which the wires are carried and laid up, and means for supporting and driving said frame, mechanism or swifts for supporting the wire in bundles in place of bobbins, tension and brake mechanism, and certain details of construction. The bundles of wire of which the rope is to be formed are laid upon the swifts in each of the 19 sections of the revolving frame, and as the frames supporting these swifts are journaled at each end in line with the axis of the revolving frame, and are provided with a heavy counter-weight, it is manifest that while the outer frame revolves, these swift-supporting frames will remain stationary with the bundles of wire uppermost. From these bundles the wire passes around the pulley of the tension device, the elasticity of which allows for any irregularity in the taking off of the wire. From this tension apparatus the wire passes through a hole

in the end of the swift-supporting frames, and is led thence outward to the pulleys on the sides of the revolving frame. A single wire or core is covered by six wires which are laid around it. These six wires forming the strand or core are again covered by 12 wires which are laid on from the outside in the well-known manner.

FEEDER FOR CAN-BODY-MAKING MACHINES.—Joseph Stevens, S. F. No. 380,774. Dated April 10, 1888. The device is for feeding sheets of tin into the machine where said sheets are bent into cylindrical shape to form can bodies. It has been customary hitherto to feed the sheets of tin by hand into the machine, by which said sheets are formed into a cylindrical shape for can bodies. This invention is designed to provide an automatic feeder for this purpose. This feeder is intended to stand in front of the body-forming machine, and its mechanism is operated by cams or cranks on the body-forming machine.

CASH REGISTER AND INDICATOR.—Edward T. Taylor, Oakland, No. 380,831. Dated April 10, 1888. This cash register and indicator consists in the employment of tubes containing disks, which represent the coins or amounts to be handled in combination with reciprocating slides, by which the disks are allowed to fall from an upper compartment to a lower one, and thus register the amount placed in the till, and in connection with these of indicators, and a mechanism by which said indicators are operated, the cover of the till or drawer opened and a bell sounded.

New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

BRADFORD QUICKSILVER M. Co., March 23. Location, Lake county, Cal. Capital stock, \$80,000, in 16 shares. Directors—C. P. Bradford, Edward Bradford, G. Frederick Bradford, John Treadwell and James Treadwell.

FORT JONES GRAVEL AND QUARTZ M. Co., March 24. Capital, \$5,000,000, in 100,000 shares. Directors—Joseph Austin, G. E. Benison, F. D. Fraser, D. Sanderson, and J. M. Haskell.

SAN RAMON VALLEY R. R. Co., March 24. Capital stock, \$1,050,000. Directors—J. P. Brown, D. D. Stuhls, W. L. Brown, A. J. Treat, and G. L. Lunsing. The road will run from Avon, on the San Pablo and Tulare railroad, to a point on the Central Pacific near Pleasanton, in Alameda county. Avon is a point a few miles east of Martinez, at the entrance of the fertile valley in which the town of Pacheco is situated. The line, which is 35 miles in length, traverses the Central valley of Contra Costa county from north to south. This valley varies from half a mile to six miles in width. The line runs west of Mount Diablo, and as surveyed touches the towns of Walnut Creek, San Ramon and Danville.

RAMONA AND SAN BERNARDINO VALLEY R. R., April 24. Capital stock, \$2,030,000. Directors—G. L. Lansing, J. P. Brown, Fred Madge, C. G. Lathrop, and C. B. Hayes. The road will run from Ramona on the Southern Pacific, in Los Angeles county, to Creston, one of the new towns in San Diego county. The estimated length is 71 miles.

PIEDMONT G. M. Co., March 25. Location, Tuscarora district, Nev. Capital stock, \$10,000,000, in 100,000 shares. Directors—A. E. Davis, Herman Zaidig, J. B. Dayton, L. Fannoff and W. R. Townsend.

Mining Share Market.

Miniog stocks continue rather quiet, notwithstanding favorable developments upon the Comstock. The Virginia Enterprise pertinently remarks: "After a mine has developed its wealth and shown beyond cavil that it contains a certain number of dollars, it loses its speculative value. That is plain enough. But that which puzzles the understanding is, to know why a mine should lose value because of the fact that it has demonstrated itself valuable. There are several such cases on the lode today. The gamble in them was pretty good until it was definitely known that they were fully as rich as the people were hetting their oash that they were, and then, after a realization of their dream, the stocks fell flat. This anomalous feature in stock gambling is simply inexplicable, and contains no further serviceable trait than to demonstrate the fact that the men who work in the mines and know what is coming in and pinching out have no advantage over the unsophisticated mud-hens, who sleep on a wedding-cake for luck."

NO REGULAR PAY-DAY.—The Tombstone (A. T.) Epitaph notes that Prof. Douglas, general manager of the Copper Queen Mining Co., recently made a speech to the miners of Bisbee, in which he stated that the wages would be \$3 50 per day; that no work would be done in the mine on Sunday, and that there would be no regular pay-day. The men could draw their money when they wanted it, or could let it remain with the company, as they pleased. This last was done to discourage gambling.

It is expected that the mines of East Belmont, Nev., will be worked on an extensive scale this season.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS, ASSESSMENTS.

COMPANY.	LOCATION.	NO. AM'T. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUIN.
Andes M Co.	Nevada.	5.	05. Feb 28. Apr 4.	May 27. J. M. Quay.	406 Montgomery St
Belcher M Co.	Nevada.	34.	50. Mar 13. Apr 17.	May 7. J. Crockett.	327 Pine St
Butte Creek Hyd M Co.	California.	12.	05. Mar 27. May 7.	June 8. L. R. Levy.	213 Market St
Baldwin S M Co.	Nevada.	1.	25. Apr 10. May 21.	June 8. W. L. Brown.	402 Montgomery St
Crispin M Co.	Arizona.	1.	10. Mar 7. Apr 15.	May 5. F. H. Leonard.	628 Montgomery St
Orograph M Co.	Arizona.	5.	25. Feb 15. Mar 27.	May 1. A. Westerman.	309 Montgomery St
Crown Point M Co.	Nevada.	49.	50. Apr 13. May 16.	June 5. J. Newlands.	323 Pine St
California Slate Co.	California.	1.	10. Apr 13. May 24.	June 25. J. H. Hanscom.	10 California St
Day M Co.	Nevada.	16.	1.00. Feb 8. Apr 8.	May 7. R. Grayson.	327 Pine St
Equitable Tunnel Co.	Utah.	33.	15. Feb 14. Mar 30.	May 9. C. J. Collins.	1018 Market St
Excelior W & M Co.	California.	11.	3.30. Mar 20. Apr 31.	May 9. W. J. Stewart.	216 Sansome St
Gray Eagle M Co.	California.	5.	04. Mar 5. Apr 10.	Apr 30. T. Wetzel.	522 Montgomery St
Golden Prize M Co.	Nevada.	58.	50. Mar 12. Apr 17.	May 10. A. K. Durkrow.	309 Montgomery St
Kennedy M Co.	California.	3.	25. Apr 21. May 25.	June 16. C. D. Bennett.	328 Montgomery St
Livermore Oil Co.	California.	2.	10. Feb 20. Apr 2.	Apr 28. L. F. Reichling.	404 Montgomery St
Mayflower Gravel M Co.	California.	41.	05. Mar 6. Apr 9.	Apr 28. H. Deas.	309 Montgomery St
Mayfield M Co.	Nevada.	13.	25. Apr 9. May 14.	June 4. J. Morizio.	328 Montgomery St
Phil Sheridan Con M Co.	Nevada.	3.	30. Apr 12. May 14.	May 7. J. W. Pew.	310 Pine St
Peerless M Co.	Arizona.	11.	10. Mar 7. Apr 14.	May 5. F. Holling.	533 Kearny St
Paradise Valley M Co.	Nevada.	5.	25. Apr 4. May 7.	May 28. A. Waterman.	309 Montgomery St
Sierra Eod M Co.	Nevada.	4.	15. Apr 21. May 29.	June 18. A. Oberman.	328 Montgomery St
Sierra Nevada S M Co.	Nevada.	17.	10. Apr 4. May 7.	May 23. R. N. Van Brunt.	318 Pine St
Trojan M Co.	Nevada.	17.	10. Mar 27. May 8.	May 23. J. F. Holling.	309 Montgomery St
Virginia Creek Hyd M Co.	California.	5.	05. Feb 28. Apr 4.	May 1. J. M. Quay.	455 Montgomery St

MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING DATE
Amador Volcano Hyd M Co.	California.	M. Casey.	15 Montgomery Ave.	Annual. May 2
Commonwealth Con M Co.	Nevada.	H. Deas.	339 Montgomery St.	Annual. May 9
Con Imperial M Co.	Nevada.	C. L. McCoy.	329 Pine St.	Annual. May 2
Church G M Co.	California.	J. M. Buffington.	303 California St.	Annual. May 8
Chicago M Co.	California.	J. Cupps.	520 Montgomery St.	Special. May 3
Diana M Co.	Nevada.	R. F. Kelley.	419 California St.	Annual. May 7
Justice M Co.	Nevada.	R. F. Kelley.	419 California St.	Annual. May 7
Live Oak Hyd M Co.	California.	J. Morizio.	328 Montgomery St.	Annual. May 7
Morgan M Co.	Nevada.	O. S. Neal.	233 Montgomery St.	Annual. May 5
Navajo Queen M Co.	Nevada.	J. S. Scoville.	305 Montgomery St.	Annual. Apr 25
Sutro Tunnel Co.	Nevada.	F. Narret.	320 Sansome St.	Adjourned. May 3

LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A. W. Haynes.	309 Montgomery St.	50	Apr 10
Eureka Con M Co.	Nevada.	H. R. P. Hutton.	305 Pine St.	25	May 7
North Belle Isle M Co.	Nevada.	J. W. Pew.	310 Pine St.	50	May 7
Oregon Coal & Navigation Co.	Oregon.	R. B. Williams.	211 Sansome St.	1.60	Mar 2
Pacific Borax, Salt & Soda Co.	California.	A. J. Clough.	22 Montgomery St.	1.00	Apr 19
Russell Reduction & M Co.	California.	J. Morizio.	328 Montgomery St.	44	Sept 17
San Francisco Copper M Co.	California.	F. E. Berier.	320 Sansome St.	44	Sept 19
Standard Con M Co.	California.	J. W. Pew.	310 Pine St.	50	May 12

Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Con. California and Virginia, April 24, \$196,873; Bluebird, 17, \$14,640; Pamlico, 21, \$20,000; Hale and Norcross, 23, \$20,771; Confidence, 24, \$13,956; Germania, 21, \$1785; Lapanta, 23, \$7153; Drumlummon, for March, \$130,400; profit on this, \$74,000; Argus, 23, \$7319; Lang Syne, 24, \$1000; Hanauer, 18, \$3300; Germania, 18, \$3724; Queen of the Hills, 20, \$1470; Germania, 20, \$3997; Savage, 26, \$20,000; Confidence, 20, \$14,276, to date in April, \$136,677; North Belle Isle, 26, \$10,000; Garfield, 21, \$4600; Pollock, 21, \$8872; Silver Bow, 21, \$14,912; Moulton, 21, \$15,184; Bluebird, 21, \$16,443; Alice, 21, \$12,320; Lexington, 21, \$32,824.

San Francisco Metal Market.

WHOLESALE.	THURSDAY, April 25, 1888.
ANTIMONY—French Star	9 @ 94
BORAX—Refined	— @ 7
Concentrated	51 @ —
COPPER—	
Bolt	25 @ 30
Sheeting	25 @ 30
Ingot	25 @ 30
Fire Box Sheet	— @ 25
IRON—Glengarnock ton	— @ 30
Eglington, ton	— @ 30
American Soft, No. 1, ton	— @ 30
Region Pig, ton	23 @ 30
Clay Lane White	— @ 23
Shotts, No. 1	— @ 31
LEAD—Pig	5 @ 51
Bar	5 @ 51
Shot	5 @ 51
Sheet, discount 10% on 500 bag	Drop, 180 @
Buck, 3/4 bag	2 @ 20
Chilled, do	2 @ 20
STEELE—English, lb.	15 @ 20
Black Diamond tool	10 @ 15
Pick and Hammer	8 @ 10
Machinery	5 @ 8
Toe Calk	41 @ —
TIN PLATE—Coke	5 @ 55
Charcoal	7 @ 725
QUICKSILVER—By the flask	35 @ 40
Flasks, new	1 @ 55
Flasks, old	85 @ —

New York Metal Market.

Telegraphic advices dated April 20th give the following New York prices:

BAR SILVER—93 1/2c per oz.

BORAX—04 1/2c.

COPPER—LARK—\$16 @ \$15.75

IRON—No. 1, \$22.00

LEAD—\$4.65 @ —

TIN—\$34.00 @ —

The following is the latest by mail from the "New York Metal Exchange Market Report":

COPPER—Firm, spot closing at \$16.05 @ \$16.75. Transferable Notices (Lake) issued at \$16.30 @ —.

LEAD—Dull, at \$4.25 @ \$4.75 spot. Transferable Notices issued at \$4.75.

TIN—Irregular at \$35.00 @ \$36.25. Transferable Notices issued at \$32.00 @ \$35.00.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery.

Australian Tin, \$36.00 @ \$36.25; Billiton Tin, \$37.50 @ —.

Banca Tin, \$38.00 @ —.

Baltimore Copper, \$15.50 @ \$16.80.

Orford Copper, \$16.00 @ \$16.50.

P. S. C. Copper, — @ —.

Foreign Lead, \$5.00 @ \$5.15.

Foreign Spelter, \$8.00 @ \$8.12.

Antimony, \$10.75 @ \$11.00.

Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

JOHN G. H. LAMPADUS—S. Barbara Co.

G. W. INGALLS—Arizona Territory.

WM. WILKINSON—Fresno Co.

A. F. JEWETT—Tulare Co.

R. G. WILLIAMS—Yuba and Sutter Co.'s.

C. G. HUSTON—Mojave Territory.

F. H. SCHAEFFER—Sacramento Co.

F. B. LOGAN—San Diego Co.

COAL remains scarce and firm, and there is very little foreign here. Supplies of domestic for house purposes are sufficient and no more. Prices show no change.

Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING APR. 5.	WEEK ENDING APR. 12.	WEEK ENDING APR. 19.	WEEK ENDING APR. 26.
Alpha	2.65	3.25	2.75	3.00
Andes	2.20	2.50	2.15	2.45
Argenta	.25	.30	.20	.25
Belcher	5.75	7.5	7.00	7.50
Brophy	5.25	5.75	5.5	5.75
Bullion	1.75	2.20	1.75	2.10
Baltimore	1.00	1.10	1.00	1.05
Belle Isle	.70	.80	.70	.80
Bodie	2.50	2.90	2.35	2.80
Benton	—	—	2.50	—
Bodie Tunnel	.90	1.00	.90	.95
Bulwer	14	15	14	15
Con. Va. & Cal.	94	115	94	115
Challenge	94	115	94	115
Champion	5.00	7.5	5.50	4.90
Confidence	31	38	33	34
Con. Imperial	6.00	6.50	6.00	6.50
Caledonia	.70	.80	.70	.80
Con. Pacific	6.75	7.25	6.5	7.00
Crown Point	1.00	1.20	.90	1.00
Crocker	—	—	—	—
Central	—	—	—	—
Challenger	—	—	—	—
East B. & O.	—	—	—	—
Eureka Con	10	12	11	11
Excelsior	1.75	2.05	1.80	2.00
Grand Prize	2.55	3.00	2.65	2.90
Hale & Norcross	4.25	4.75	4.65	4.50
Holmes	2.5	3.1	2.8	3.0
Independence	—	—	—	—
Iowa	1.25	1.45	1.30	1.45
Jules	.65	.70	.65	.70
Justice	1.40	1.55	1.40	1.55
Kentuck	8.50	4.35	3.50	4.00
Lady Wash	.55	.75	.65	.80
Martin White	1.75	2.20	1.70	2.10
Mexican	5.50	6.5	4.90	5.5
Mt. Diablo	—	—	—	—
Northern Belle	2.30	1.80	1.95	1.45
Nevada	6.00	7.25	6.1	5.5
North Belle Isle	5	6	5.5	6
Nev. Queen	4.00	4.40	4.05	4.40
North G. & O.	2.10	2.30	1.70	2.10
Oceidental	2.50	10	8	10
Ophir	2.75	3.15	2.85	3.10
Overman	1.4	5.1	4.45	5.25
Potosi	1.45	5.1	4.45	5.25
Peerless	1.45	5.1	4.45	5.25
Perr	.60	.75	.65	.85
P. Sheridan	6.50	6.75	6.1	6.35
Silver Star	.65	5.50	5.75	5.1
Savage	.475	5.1	5.00	5.45
S. B. & M.	.45	5.1	5.00	5.45
Sierra Nevada	.45	5.1	5.00	5.45
Silver Hill	.85	1.00	.75	.80
Silver King	.85	1.00	.75	.80
Scorpion	.85	1.00	.75	.80
Syndicate	.85	1.00	.75	.80
Union Con	.85	1.00	.75	.80
Utah	.85	1.00	.75	.80
Yellow Jacket	.85	1.00	.75	.80

Sales at San Francisco Stock Exchange.

WEDNESDAY April 26.		200	Julia	550
50 Alpha	2.45	100	Keyes	2.40
400 Alpha	1.90	270	Kentuck	2.90
400 Andes	1.00	170	Mexican	4.90
20 Baltimore	.80	305	N. Belle Is.	.5
30 Belcher	.85	100	Nev. Queen	4.25
90 E. & Belcher	.50	230	Ophir	.8
100 Bullion	1.70	150	Overman	2.45
520 Bodie	2.90	100	Occidental Con	1.75
215 Challenge	.85	500	Peerless	1.80
130 Chollar	.75	550	Perr	.80
50 Con Va & Cal	.125	250	Potosi	.45
400 Crocker	1.15	175	Savage	.45
150 Crown Point	.55	200	Scorpion	.75
150 C. B. & M.	.75	150	S. E. & M.	4.60
100 Excelsior	1.45	350	Sierra Nevada	4.15
780 Gould & Curry	4.75	50	Silver Hill	.65
100 Grand Prize	2.55	150	Union Con	4.00
300 Hale & Norcross	.55	200	Utah	1.85
100 Justice	1.30	580	Yellow Jacket	.65

Complimentary Samples.

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## Boiler Inspection.

The Pacific Coast Association of Stationary Engineers has addressed a letter to the various Republican and Democratic clubs in this city. It has especial reference to the steamer Julia disaster, and was the result of a discussion held at the last meeting of the engineers. The letter will be sent to the State Conventions, and is as follows:

PACIFIC COAST ASSOCIATION OF STATIONARY ENGINEERS, 1325 MARKET STREET, SAN FRANCISCO, April 20, 1888.

Gentlemen: The above-named association respectfully requests that you instruct your delegates to the State Convention to endeavor to procure the insertion of a plank in the platform of the party demanding the annual inspection of steam boilers, and the examination of the men in charge of them as to their competency.

From the destruction of life, property, etc., resulting from recent explosions you must all be aware of the danger attending the use of steam boilers, even under the most favorable conditions.

At present there is no State law governing the use of steam boilers or the men in charge of them, consequently laborers or mechanics working in planing-mills, factories, etc., are liable any moment to be hurled into eternity, through the avarice of some boiler-owners or the ignorance of the cheap man or boy in charge.

We have formerly appealed to the Legislature to pass the desired laws, but the vigorous opposition of a few wealthy steam users has succeeded in preventing the passage of said laws. We now appeal direct to the people, whom we know are heartily in favor of such laws.

By instructing your delegates, as above requested, you will be protecting yourselves as much as any or all of the members of this association.

Trusting that our request will be approved and acted on by your body, we are, yours respectfully,

W. J. MOORE, President.

ALEXANDER MCCONNELL, Secretary.

## Don't Fail to Write.

Should this paper be received by any subscriber who does not want it, or beyond the time he intends to pay for it, let him not fail to write us direct to stop it. A postal card (costing one cent only) will suffice. We will not knowingly send the paper to anyone who does not wish it, but if it is continued, through the failure of the subscriber to notify us to discontinue it, or some irresponsible party requested to stop it, we shall positively demand payment for the time it is sent. LOOK CAREFULLY AT THE LABEL ON YOUR PAPER.

J. A. JOHNSON, 307 Montgomery street (the Nevada Bank building) is the general agent of the Stiles quartz machinery, and offers easy terms for introduction.

## ASSESSMENT NOTICE.

**Butte Creek Hydraulic Mining Company.**  
Location of principal place of business, San Francisco, California. Location of Works, Butte county, Cal.

NOTICE is hereby given, that at a meeting of the Board of Directors, held on the 27th day of March, 1888, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary at the office of the company, No. 213 Market street, San Francisco, Cal. Any stock upon which this assessment shall remain unpaid on the 7th day of May, 1888, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on Monday, the 27th day of May, 1888, to pay the delinquent assessment, together with costs of advertising and expenses of sale. By order of the Board of Directors.

LOUIS R. LEVY, Secretary.

Office—No. 213 Market street, San Francisco, Cal.

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1 No. 3 Knowles Pump.  
1 Small Hooker Pump.  
7 Burleigh Tunnel Drills.  
1 Lot of Drill Extras.  
1 "E" Battery for blasting.  
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The machinery is all in good order and can be seen at our works. For prices and other information, address

BIG BEND TUNNEL & M'G CO.,

Big Bend, Butte Co., Cal.



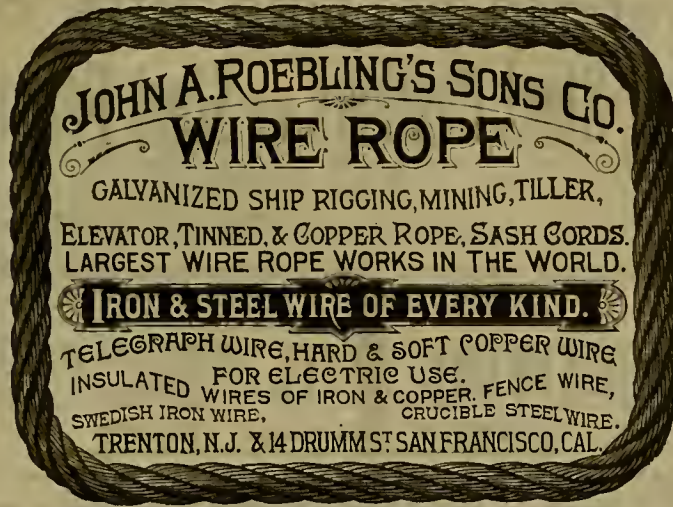
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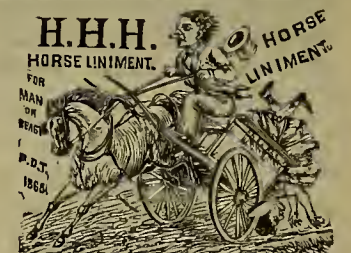
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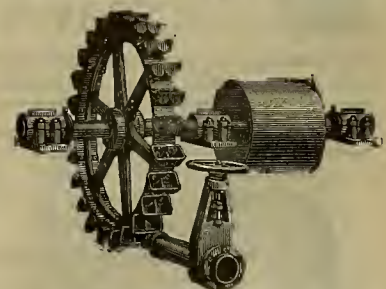
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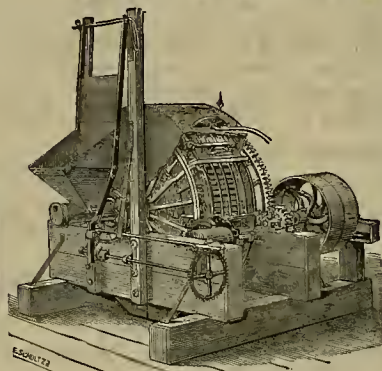
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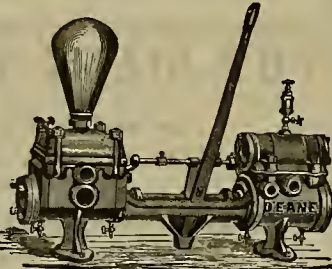
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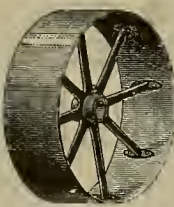
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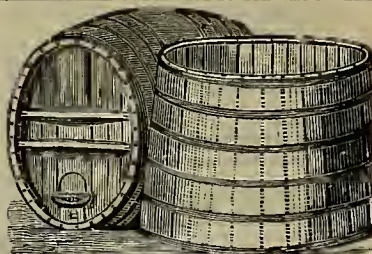
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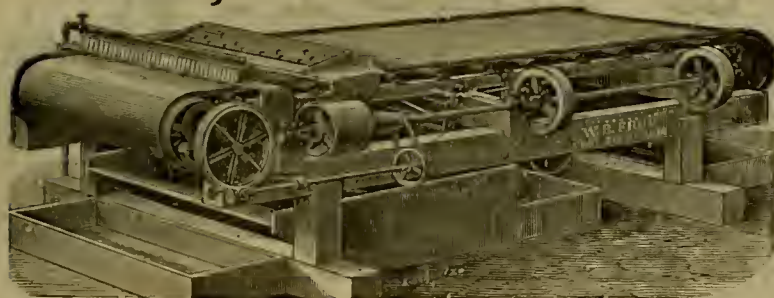
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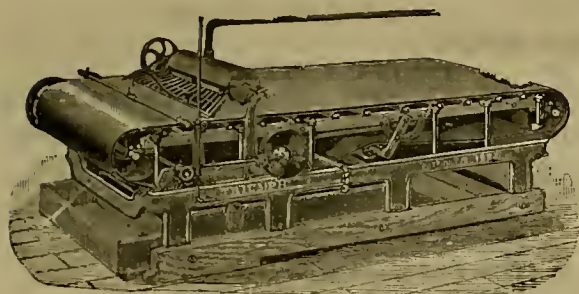
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Protected by patents May 4, 1879; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

**THE FRUE ORE CONCENTRATOR OR VANNING MACHINE.**

**ADAMS & CARTER, Agents Frue Vanning Machine Co.,**  
Room 7, No. 109 California Street, **SAN FRANCISCO, CAL.**

**\$1,000 CHALLENGE ACCEPTED,**  
**PRICE, FIVE HUNDRED AND FIFTY DOLLARS (\$550.00).**



**THE "TRIUMPH" ORE CONCENTRATOR.**

The present improved form of the celebrated "TRIUMPH" Ore Concentrator possesses many advantages over any other style of Vanners, Vanning Machines, or Concentrators, yet introduced to the notice of mining men. These advantages consist in the superior features which enter into their construction, and facilitate their operation.

They are constructed in the best manner; their frames being of iron, insures their solidity, durability, and perfect steadiness of motion when operated. They are built as compactly as their requisite strength will permit, weigh less, require less freight space in boxes, by which their cost of transportation is reduced, and occupy less mill room when set up.

An important improvement has recently been introduced into their construction, which consists of a RIFFLE TABLE placed in front of and which takes the discharge from the feed and amalgam bowl. The improvement is in the reciprocal motion which is imparted to this table by the longitudinal motion of the shaking frame to which the table is attached. We have at hand many testimonials, from well-known Superintendents of mines in different mining districts of the United States, bearing evidence of the efficiency and superiority of this form of Concentrator, and we shall be pleased to send Circulars covering such letters of testimony, and, as well, directions for setting up and operating these machines, and are ready to quote special prices for any considerable order.

**JOSHUA HENDY MACHINE WORKS,**

**Nos. 39 to 51 Fremont St.,**

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**RANKIN, BRAYTON & CO.,**  
...BUILDERS OF...  
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PLANTS FOR GOLD AND SILVER MILLS, embracing machinery of LATEST DESIGN and MOST IMPROVED construction. We offer our customers the BEST RESULTS OF 35 YEARS' EXPERIENCE in this SPECIAL LINE of work, and are PREPARED to furnish from SAN FRANCISCO or CHICAGO, the MOST APPROVED character of MINING AND REDUCTION MACHINERY, adapted to all grades of ores and SUPERIOR to that of any other make, at the LOWEST POSSIBLE PRICES.

We are also prepared to CONSTRUCT and DELIVER in COMPLETE RUNNING ORDER, in any locality, MILLS, CONCENTRATION WORKS, WATER JACKET SMELTING FURNACES, HOISTING WORKS, PUMPING MACHINERY, ETC., ETC., of any DESIRED CAPACITY.

**THE HAZELTON BOILER.**

**A NEW AND RADICAL DEPARTURE IN**

**STEAM GENERATOR.**

**DESTINED TO REVOLUTIONIZE ALL FORMER METHODS. A SAVING IN FUEL OF AT LEAST 25 PER CENT GUARANTEED OVER ANY OTHER STYLE OF BOILER.**

The following parties have these Boilers in use or under construction on this Coast, to whom reference is made:

Spring Valley Water Works, S. F.	1 200 H. P.	Starr & Co. Mills, Wheatport.	1 100 H. P.	San Jose & Santa Clara Electric R. Co.	1 100 H. P.
Southern Pacific R. R. Co., S. F.	1 75 H. P.	Selby Smelting Works, Vallejo Junction.	2 125 H. P.	San Diego Electric R. R. Co.	1 100 H. P.
California Cotton Mills, East Oakland.	1 150 H. P.	Selby Smelting Works, Vallejo Junction.	1 75 H. P.	Los Angeles Electric R. R. Co.	1 100 H. P.
Harmony Borax Mining Company, Alameda.	1 75 H. P.	Oakland Gas Light Co., Oakland.	1 200 H. P.	La Luz Mining Co., Mexico.	3 75 H. P.
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MANUFACTURER OF

**Centrifugal Roller Quartz Mills,**

**CONCENTRATORS AND ORE CRUSHERS,**

**Mining Machinery of Every Description,**

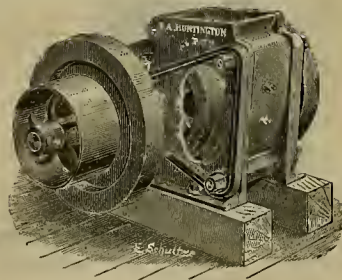
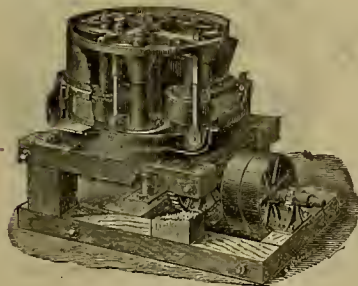
**Steam Engines and Shingle Machines.**

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Centrifugal Roller Quartz Mill.

No. 45 FREMONT STREET. - - - SAN FRANCISCO, CAL.

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SOLE AGENT FOR  
Adamantine Shoes, Dies and  
CRUSHER PLATES,  
—AND—  
Chrome Cast Steel for  
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220 Fremont St., San Francisco,  
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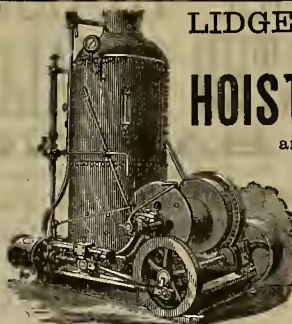
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PARKE, LACY & CO., Agents,  
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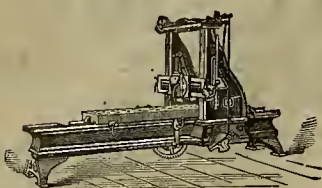
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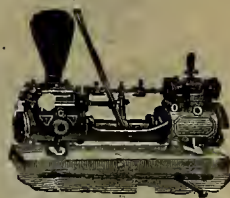


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Mining Machinery, Steam Pumps, Wood and Iron Working Machinery  
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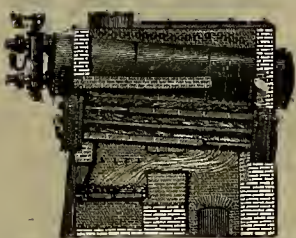
L. R. MEAD, Secretary.

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Location of Works, S. E. Cor. Beale and Howard Sts., San Francisco.

Manufacturers and Sole Agents for the Pacific Coast for

**HEINE SAFETY  
WATER TUBE  
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Has the Following Advantages:  
**SAFETY,  
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60,000 Horse Power now in use.

Boilers can be seen working in San Francisco at Palace Hotel, Spring Valley Water Works, Hueter Bros. &amp; Co., California Jute Mills, and other places.

Guaranteed More Efficient than any other Boiler made.

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**QUARTZ MILLS**—Gold and Silver, Copper and Lead Smelting Works, Roasting Furnaces of all kinds.  
**AIR COMPRESSORS**—Rope Power Transmission.  
**HYDRAULIC PUMPING** and Hoisting Machinery.  
**WROUGHT-IRON WATER PIPE** a Specialty. Note.—Have just completed order for 35 miles of 44-inch pipe of 4-inch iron for Spring Valley Water Works Company, San Francisco.  
**SAW-MILL MACHINERY** of all kinds.  
**STEAM ENGINES**—Corliss, Slide-Valve, Poppet Valve Automatic, Single, and Compound.  
**SOLE MANUFACTURERS** for Pacific Coast of the Celebrated "Heine" Patent Safety Boiler (Water Tube); 60,000 horse power now in use.  
**MACEETH PATENT STEEL-RIM PULLEYS**—Fifty per cent lighter and 25 per cent cheaper than cast-iron pulleys; will not break in transportation.

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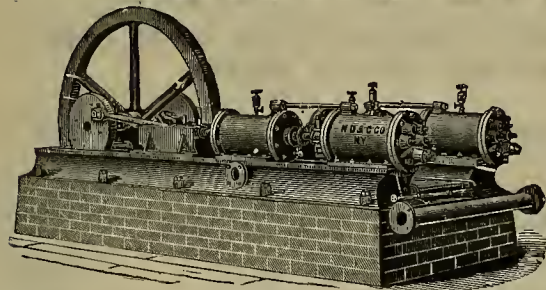
Builders of 120-stamp Gold Mill for the Alaska Mill and Mining Company; 60-stamp Mill for Quartz Mountain Mining Company.

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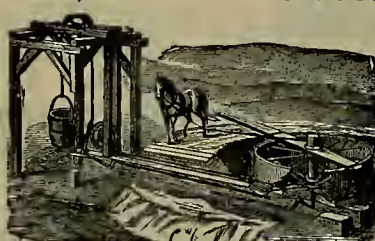
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SINGLE OR DUPLEX, STEAM OR BELT POWER.  
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Over 300 in use. All estimates guaranteed. Send for Circular.

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All wrought iron. No gears, no breakage. One horse will easily handle rock or water to a depth of 350 feet, giving entire satisfaction to the prospector. Price, complete, \$200. 150 sold on this Coast.



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200 Sold on this Coast. Has less repairs than any other Drill.

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For Saving Gold in QUARTZ, GRAVEL and PLACER MINING,

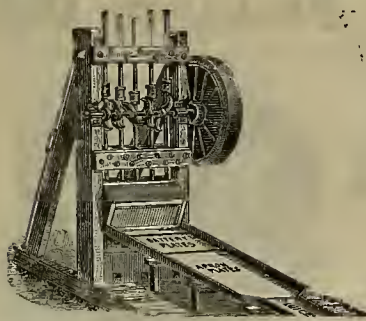
At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best, and far superior to others in weight of silver and durability. Old mining plates replated. These plates can also be purchased of JOHN TAYLOR &amp; CO., cor. First and Mission Sts.

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NOTICE.—Mining men are cautioned against fraud in purchasing poor mining plates made in this city; they have proved defective in the Silver-plating, and in having much less Silver than was contracted for. When in doubt make an assay; thin, light Silver-plating looks the same as heavy. SEND FOR CIRCULAR.



**NOTICE TO GOLD MINERS!**  
**SILVER-PLATED AMALGAMATED PLATES**  
**For SAVING GOLD!**  
IN QUARTZ, GRAVEL, OR PLACER MINES. MADE OF BEST SOFT LAKE SUPERIOR COPPER  
FULL WEIGHT OF SILVER AND BEST QUALITY OF WORK GUARANTEED.

GET OUR PRICES BEFORE ORDERING ELSEWHERE. SAMPLES FURNISHED ON APPLICATION.

**SAN FRANCISCO NOVELTY AND PLATING WORKS,**  
**No. 108 FIRST STREET.**

NOTICE.—All our plates are guaranteed to have the full weight of silver agreed upon, and are tested before leaving our works, thereby avoiding the complaints about light weight, made so often before we started in this branch of industry.

**JUSTINIAN CAIRE, Agent,**  
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—DEALER IN—

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HYDRO-CARBON ASSAY FURNACES



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MAY 5, 1888.

VOLUME LV.  
Number 18

## California Marine Engines.

Within the past three years the coasting trade has largely increased in California, especially that connected with the lumbering interest. Formerly all the lumber was transported on sailing schooners, but of late steam schooners have been employed. These vessels have masts and sails, and use the sails when the wind is fair, but they steam up the coast against the summer winds, which blow from the northwest. So while the schooners from the lumber ports have a fair wind down when loaded, they steam up when light, and a great deal of time is saved.

The Fulton Iron Works of this city have built most of the engines for those steam schooners, having made a specialty of this class of work. We give on this page an engraving of the type of compound engines made by them. They are made from 50 to 500-horse power in sizes, but of the same type. As a rule they are the ordinary engines, built compactly and light, and do not differ in arrangement from compound engine as built all over the world. The simplest and most efficient details have been adopted. The engraving shows the style plainly. For the lumber schooners engines are made from 150 to 300-horse power; the larger ones for colliers, etc.

There are some eight or ten of these engines being made at the Fulton Works now, and this week we saw several of them set up and receiving the finishing touches. There are four of the ordinary compound on hand, all of 150-horse power, and three are those of 200-horse power. Several triple-compound engines have been and are being made—those for the Noyo, San Diego, Point Loma, and one other, are complete. The trial trip of the Point Loma was made this week, and was very satisfactory. One quadruple engine is now being fitted up for a coaster. A large triple-engine is being built for a steam collier. This engine will have a high-pressure cylinder of 18 inches, intermediate of 30 inches, and low-pressure cylinder of 48½ inches, with 36-inch stroke. This is about a 600-horse power engine. The steel plates for the boilers of the triple-engines are an inch thick, and those for the quadruple are 1½ inch thick. The triple-engines are made for 150 pounds pressure, and the quadruples to run with 175 pounds. All the engines are compactly made and are strong and durable.

THE Lyon county Times says: "The boat for the Carson River Dredging Co. is now floating on the bottom of the Carson, and draws less than four inches of water. The machinery has been arriving steadily and it is almost certain that it will be all here, and placed before the 1st of June. The large pieces are all here excepting the crane and two 50-horse power engines. The engines are on the road and expected to arrive this week. As soon as the crane arrives, men will be put on, the machinery put in place, and its efficiency fully tested.

THE Clayton Mining & Smelting Co. of Clayton, Idaho, have ordered an Ingersoll air compressing plant and Ingersoll drills for use in their mines, which machinery is now en route for Clayton.

OVER at Silver Reef, Utah, they are talking about a mysterious process of working their sandstone ores by concentrating the sun's rays in some manner not explained.

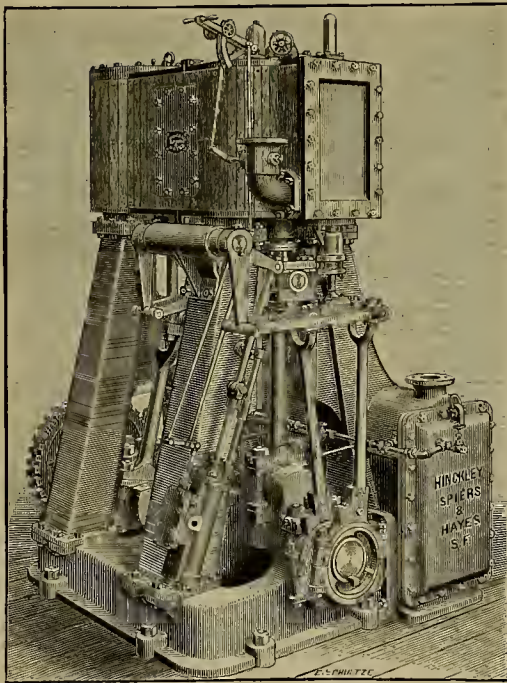
## Tin.

The French syndicate which has cornered the copper market has also been trying its hand on tin, and succeeded in forcing prices up considerably. But this week a sudden drop has come, and the decline in the foreign market is said to be equivalent to about \$50 a ton. This has seriously crippled not only foreign speculators but those at home. On May 1st they had to suspend calls on tin in the New York Metal Exchange until the market is more settled.

To use a slang phrase, the Frenchmen have "hit off more than they could chew," and evidently they will drop the tin corner and pay attention to the one they are managing on

## Coal at Livermore.

Steps are being taken to systematically open the mines belonging to the Livermore Coal Co., eight miles southeast of Livermore, Alameda county. Three distinct veins have been prospected, known as the Richards, Summit and Eureka, which are four, six and eight feet wide, respectively. The Richards vein is developed to a depth of 120 feet, where the coal is found to be about four feet wide and free from foreign matter. The Richards vein is connected with the Eureka by a tunnel at a depth of 60 feet, showing the Eureka to be 8 to 11 feet wide at that point, though no prospecting has been done on it. The Summit lies parallel with the Richards and is about 1000 feet distant. From



COMPOUND ENGINE FOR MARINE USE.

copper. Their losses are said to be up in the millions. This, to a certain extent, bears out our remarks in the PRESS of last week suggesting that people be careful in their dealings with the copper market, in view of the fact that the French syndicate might not be able to maintain prices at present rates as long as expected. They have been unable to do so with tin, as the events of this week show. They stopped buying tin, and as soon as they did a heavy fall in prices ensued. What will be the result if they stop buying copper, outside of their present contracts, remains to be seen. The copper interests of this country are benefited by the present high prices of course, but there is no telling how long they will be maintained, and if heavy enterprises are started on the present basis of price no one can tell what will result. It is stated that a Cornish expert has been examining the Tenescal tin deposits, San Bernardino county, in this State, and will make a report to English capitalists.

Development is going on in the tin mines of the Black Hills, Dakota, and it is expected that before long more or less metal will be put on the market.

this about 3000 tons of coal have been mined and sold at Livermore, San Jose, Stockton, Oakland and Santa Clara. It costs about \$1 50 per ton to mine, and cost of transportation is about \$2 per ton. It is expected that the Southern Pacific will build a branch road from Livermore as soon as the mines are developed and mining commenced in earnest.

It is stated that some \$20,000 have been expended on tunnels, shafts, stopes, etc. Robt. Stevenson, M. E., states that this coal is more of a bituminous character than a lignite. He is of the opinion that with prevailing prices of coal the mines can be worked profitably with a small capital, as the coal taken out will almost pay for necessary development. The following is the result of the analysis made by Prof. Price: Samples from Summit vein—water, 18.08; volatile carbonaceous matter, 39.30; fixed carbon, 35.61; ash, 7.01.

Samples from Richards vein—water, 20.78; volatile carbonaceous matter, 31.00; fixed carbon, 42.46; ash, 5.70.

Big steel works are to be built in Kittitas Co., Washington Territory, by an English Co.

## Some New Facts in Pocket Mining.

The auriferous deposits of California are more varied in their form of occurrence probably than in any other country, conditions that have led to the employment of equally diversified methods and appliances in searching after, exploiting and working them. It would naturally occur to most minds that after an experience of so many years the California gold miner would by this time have found out all there is to be learned in regard to the occurrence of this class of deposits as well as the rules to be observed in hunting after and developing them. While it must be admitted that our miners have become very expert both in this and every other branch of their calling, it is still the case that something new is all the while being brought to light in this department of the business.

As an instance in point the Sonora Democrat, Tuolumne county, describes certain new features that have been developed in the Bonanza Pocket mine being worked near that town. Formerly it was thought that this class of deposits did not carry free gold below the line of permanent water, where it was supposed the metal invariably took on the sulphureted form. The theory was also held that when the dike changed from a plastic to a hard and gritty rock, requiring blasting, it lost its gold-bearing character entirely. But recent developments in the above mine tend to invalidate if not wholly disprove both these theories. The auriferous lode or dike here has been opened up to a depth of 35 feet below the bed of Wood's creek, a permanent stream, and consequently below the level of permanent water; and yet the gold continues as free as it was above. Then, too, the lode formation has changed color and become so hard that it has to be broken out with powder, yet its productiveness has not been diminished in the least. The position of the rich pockets in this mine are marked by other peculiarities at variance with the notions formerly entertained in regard to the occurrence of this class of deposits.

In view of the above facts, it may be that our pocket miners have sometimes and perhaps very often suspended operations too soon, having been misled by hastily formed theories in regard to the changed condition of the gold-containing rock and the metal becoming sulphureted below the line of permanent water. As the business of prospecting for and extracting these "pockets," which consist of isolated bunches of rich ore, is still practiced in many parts of California, being quite active in Tuolumne county, the foregoing facts may be worthy the attention of those engaged in this branch of mining.

LEAD AND LEAD ORES.—Senator Stewart of Nevada is engaged in an important controversy with the Treasury Department concerning lead and lead ore. Both articles are taxed 1½ cents per pound by law. Several years since ex-Secretary Sherman ruled that such stuff coming in from foreign countries—mainly Mexico and Canada—when mixed with gold and silver, should come in free under the law admitting such metals free of tariff. This ruling has brought all the lead and lead ore in mixed with any precious metals, and no duty has been paid. Stewart objects to such policy, and demands that all gold and silver ore mixed with 10 per cent of lead shall be made dutiable.



### The Comstock.

The *Territorial Enterprise* has a long article showing what has been done on the Comstock since 1881. On the 15th of January of that year there were 16 stamps started at the Mexican mill on Crown Point ore. Previous to that date, after the bonanzas quitted their yield of pay ore, there was not a stamp dropping on Comstock ore for a long time. There was not a pick at work in Gold Hill. Development was going on by sinking and drifting to find new ore bodies below, and assessments were so numerous and heavy that most of the stock in the mines went into the coffers for delinquency. Real estate went out of sight. Property could not be sold or given away. The grass was growing in the streets and coyotes were killed within a few yards of C street.

Then it was that a few men met in the Crown Point office in Gold Hill and had a sort of council of war, though they had often interchanged views on the situation at every casual meeting. There was an immense amount of property going to rack and ruin in the shape of mills on the river that would never bring a dollar, except for old iron, and that would not pay the freight. The question was to do something; make some effort to preserve the workings of the mines—make a sort of last stand. Consultations were had with Mr. Mackay, Mr. Feir, Mr. Requa and other gentlemen, and they met nothing but discouragement, being told: "Gentlemen, we have mined there." "I have swept such and such walls with a broom," said one; "I superintended the work in this or that mine," said another, who stands so high as a miner that no one would ever believe he had left a dollar behind; and he considered it pre-emption on the part of any one who did. They advised John P. Jones, Sam Jones, Evan Williams and others, who wanted to make one grand effort, to save themselves. The advice was well meant, for failure meant lasting poverty; they were all then poor and in no condition for so hazardous an undertaking. Against all advice and every remonstrance, against the experience of the best miners and mining men the Comstock or the world ever saw, John P. Jones and his brother and Evan Williams started in to see what could be done. Sam Jones put 15 men at work in the Crown Point, and Evan Williams repaired 16 stamps and four pans of the Mexican mill.

The first month there were 500 tons of ore milled, which yielded \$7900, from which the discount had to be taken off. For several months afterward the yield was much poorer, and time and again men were laid off in order to bring the receipts up to the expenditures—but the mine was being explored all the time. As ore commenced coming in, the mill was enlarged a few stamps at a time, until the 44 stamps were running. In April of the same year, the Vivian mill was started on Belcher ore. Then the Brunswick mill, which was then controlled by the Bonanza firm, was started on Yellow Jacket ore. Everything worked was low-grade ore. Shortly after that the Bonanza firm started the Morgan mill on latches of ore from the Ophir, and then the Eureka mill started on Hale and Norcross ore in June, 1884. Then Senator Jones got a contract to work in the Con. Cal. and Virginia between certain levels. The Eureka mill was started on Con. Cal. and Virginia ore in November, 1884, and the Morgan mill was started on the same ore in July, 1885, and both have been running ever since.

Assessments began to come in again, and the Best and Belcher, Gould and Curry, Savage, Hale and Norcross, Chollar, Potosi, Ballion, Alpha, Eschequer, Confidence, Challenge, and many other mines, commenced to follow in the footsteps of the pioneers of the grand revival, and pierced the boundaries set by the former miners, and all have uncovered ore bodies, until the pay-rolls for wages on the Comstock have been raised from about \$50,000 per month to \$250,000—every dollar of which can now be paid from dividends.

This is an evidence of the changes that frequently come about in mining camps. Virginia City is to-day the liveliest mining town on the coast, while a few years ago it was virtually abandoned. Such a change will be seen in this district one of these days.

**EL DORADO COUNTY MINES.**—It is a well-known fact that we have in El Dorado county as good mines as are to be found in any part of California. But for various reasons too many of them that have been partially opened in past years are non-productive at the present time. In the first place, we lack the necessary capital with which to make proper developments. This fact, however, is not to be wondered at when we consider for a moment the large sums of money that have been squandered by men who have been placed in charge of mining operations, wholly without experience in the management of such work. They may be good business men, but it would be just as wise to put a dry goods clerk in a blacksmith shop to weld tires on wagon wheels as to put him in charge of a mine where he knows nothing of the nature of the work to be done. Men without experience are often imposed upon in letting contracts for timbers and all other supplies, and in not knowing how much labor a man ought to perform in one day. It is therefore important that a man who takes charge of such a work should understand his business,

and not only make occasional visits when it is convenient; and whether they attend to their business or not, the pay-roll goes on all the same. It is therefore not to be wondered at that capitalists hesitate to come to our rescue in the development of our valuable mines. But with the objections of mismanagement and neglect of duty on the part of managers of mining enterprises removed, capitalists will willingly come forward with their money, well knowing that with honest, economical and systematic management, mining is the best business in California to-day.

### California Maple Sugar.

A very interesting product was received at the Agricultural Laboratory of the State University last week from Pleacer county, in the form of maple sugar made from the sap of one of our native California maples, *Acer macrophylla*, or, as it is commonly called, the broad-leaved maple. The *Foothill Tidings* says that in spite of the declaration of old sugar-makers from the East that the trees were not sugar maples, Mr. Moulton, who lives about four miles southeast of Grass Valley, determined to try the sap and found that he could make syrup and sugar of excellent quality. Three University students—Cornelius Lakenen, Herbert Fletcher and Burton Hall—went out to the Moulton place and found that good sugar and syrup had been made by Mr. Moulton from the sap of the native maple. They secured specimens of the sugar and syrup and branches of the trees, and brought them to the University that the sugar might be chemically tested.

We had the pleasure of sampling this sugar the other day, and of seeing the leaves and bloom of the trees. The latter show that the trees are the *Acer macrophylla*, as we have stated. The sugar has the true maple flavor, grain, etc., and leaves, no doubt, of the sugar property of our native maple, if, in fact, doubt generally existed. Maple sugar has been made in this State before. We recall one case in the neighborhood of Santa Cruz a few years ago. It remains to determine how great is the yield of the native tree of certain size and whether the manufacture of the sugar and syrup can be profitably prosecuted.

Our broad-leaved maple is one of the best sidewalk and shade trees in regions where it does well. It has a wide range, too. It attains considerable size and a very beautiful and symmetrical shape. It grows very readily from the seed, which is produced in large quantities. Every spring, under the trees, on the University grounds, the young volunteer seedlings come up thick as a sowing of hickweed, which the plants much resemble when they put forth their first pair of leaves.

We have always looked upon this maple as one of the most promising trees for timber culture planting as well as for wayside, street, or lawn shelter, or ornament. It attains size very quickly in a favorable situation, and its seedlings seem quite hardy.

In clearing up land it will be well to save the maples where their presence can be tolerated. This is already being done in some cases. The *Foothill Tidings* has heard of at least one clearer, Michael Manion, who found many maples while clearing and saved them all. "They make a beautiful shade tree, even if they should not prove to be sugar maples," said Mr. Manion. We are glad that opportunity thus offers to call more general attention to this very beautiful and useful native tree.

**SALTING A MINE.**—"I tell you that a man who has a mine to sell and has ore in it cannot rob a purchaser," said a mining superintendent yesterday. "I'll just tell you what I then considered the meanest thing I ever did in my life, to illustrate what I mean. In 1852, at French Corral, California, I put up the first tail flume ever put up in California. There arose a little litigation with regard to the sluices and the water, and I wanted to get out of the enterprise. I cleaned up \$200 one day from my flume, and I put the amalgam back (salted the claim, you know), in the flume, and got a man to watch me take out \$400 the next day. A few days later I sold this claim for \$7000, and the parties who purchased it cleaned up over \$100,000 out of it in a few months. That's why I say that a miner selling a claim with any ore in it at all cannot rob a purchaser."—*Virginia Enterprise*.

**THE BOSS PROCESS.**—Albert Barber, superintendent of the Barber Mining & Milling Co., Calico, Cal., thus writes to M. P. Boss of San Francisco of the Boss continuous milling process: "We are doing splendid work, the average being above 92 per cent; we worked some Comet ore last week to above 95 per cent; this ore has always been considered the hardest ore to work in the district. I worked the same ore at Waterman, dry crushing, and amalgamated 18 hours in pan and only obtained 92 per cent."

**THE PANLICO.**—Again has the famous Panlico mine, Nev., proven her intrinsic value. Last week seven sacks of ore, weighing about 820 pounds, were worked at the Kinkead mill, yielding a bar of bullion valued at \$11,000. Another lot of second-class ore—20 tons—was worked at the same place this week, from which a bar of gold bullion worth \$9000 was produced. The company is now at work taking out more of this class of ore.

### The Mines and Miners.

BY PEDRO CASTERA.

(Continued from our last.)

[Translated for the Press from *El Minero Mexicano* by M. N. M.]

#### Los Morrongos.

The miners know the meaning of this word, but for those who do not we will give a brief explanation. The *morrongos* are boys who go into the mines with the laborers and to whom are assigned easy duties, such as carrying a light for the foreman of the works, guiding the peons, bringing candles, irons, water, etc. They are expeditious, light, vivacious, restless and quick-tempered. They know the mine—with all its outlets and entrances, cañons and holes, galleries or levels, descensos or resting-places, escondites or hiding-places, and heaps of rubbish, as well as they know their own homes. If the light goes out, they proceed in the dark by touch; if an accident happens, they are the first to give notice of it; if a harretero heats a woman, the child defends her, screams at the man, insults him, and only ceases because another has come to aid him in defending her. After such a quarrel the little fellow thus expresses himself: "The caiman (nickname of a harretero) was heating la Chata (nickname of the woman). The coward, he does not know how to be a man." Sometimes they fight among themselves. If asked why they beat each other, the reply is, "I am learning to be a man." It provokes them to be called little fellows. "I am small but strong," they reply.

Generally they are orphans, but if they have fathers they aid in supporting the family. The writer knew one of these boys in Zacatecas, only nine years old, who maintained a sister of four, and a grandmother of sixty years, with the two reals a day which he earned.

#### They Are Morrongos

Until they reach the age of twelve, peonitos until fifteen, then faeneros, next harreteros, and lastly mandones and perhaps chiefs in their old age. The *morrongo* is not the gamin or pillule of Paris, the *Gavroche*, described by Victor Hugo, nor is he the *chico* of the great city, but the child of the mine. He is the homunculus of Goethe, but formed in the shade by toil, the rapid development of a man though a struggle. Larvæ they are that begin to crawl amid the darkness at the age of five, and at thirty are herculean.

At first, they are children who play in the abysses, and afterward men who know how to vanquish them. Always audacious, never cowards, they are, in general, of good tendencies and noble hearted. In the struggle, however, three-fourths of them succumb to anemia and excessive labor before reaching their twentieth year; when one dies, the others only smile sadly and murmur, "It is better so; now his fatigues are ended and he is with God." Sublime confidence of the child, who, innocent of ingratitude, never doubts the existence of his Divine Father! A reunion of *morrongos* is like a group of birds; they leap, play, chatter, scream and sing. Who knows what exists in the young bird? In both there is song, mirth and innocence; for my part, I prefer the sparrow to the eagle, the child to the man.

Tildio was so called because of his long legs, which were always bare, except on Sundays, and on account of his lightness and agility. A dirty shirt, breeches made of blanket and a piece or crown of a hat constituted his dress. He presented himself before Leon with his eyes down and turning between his fingers the shred of head-covering.

"Where is the fire?" inquired Leon.

"The what?" said the boy, opening his eyes wonderingly.

"The fire, Tildio; where is it?"

"It is in the Preciosa."

Is the whole work burning?"

"Entirely, Amo."

"Why have they not given notice?"

"The mandon sent me in advance. He told me to go up quick and ring an alarm; but there he comes to make report," added the boy, pointing to a man of athletic figure and dark color, who had just come out of the shaft and was approaching the young men.

"A superb man!" exclaimed Henry, looking at him.

The mandon made his statement. "The fire," he said, "had begun without the knowledge of any one, and in a few minutes had spread over more than a hundred varas of the gallery, leaving out off and without communication about eighty men. The Sota minero (deputy), contending against the fire with the others there, had given information and demanded prompt assistance."

Leon communicated this to the administrator, and he in turn to the director-general. In the meantime the patio of the mine had been filled with harreteros and operatives of the neighboring mines, who came to assist, brought together by the sinister alarm. Two thousand men, grouped in a compact mass, were awaiting orders. The director in a loud voice exclaimed: "The rayador to the tiro of Santa Lucia, with fifty paradás, and choke up its mouth! The chief miner with five hundred men will go into the mine! All the pumps into service and adelante—sin novedad!"

A precipitate movement took place, but with order, Leon going toward the mouth of the shaft, which continued throwing out smoke.

"*Mens agita molem*," murmured Henry, following the young man, who was among the harreteros that were hastening through the black and deep tiro singing their alahado.

#### The Ladders of the Mine

Were formed of two large parallel cables which were connected by pieces of live-oak that served as steps; but in spite of their firmness the ladders were creaking under the weight of such a multitude. The walls of the tiro were lined with wood; great beams rested against the hack, forming a square enverjado which sustained a prism opened in the rock with powder, the labor of men and by time. The water of the pumps was falling in copious showers upon the walls of the tiro and wetting the wood, to prevent the fire from attacking it. The smoke was ascending, also a confused clamor; and the distant crackling of the burning wood, the mournful ringing of the church-bell, the sound of the alarm-bell and the song of the harreteros, united to the deafening noise of the tramping upon the trembling ladders, were mingling above the abyss.

Henry was rapidly descending. Soon he felt a foot resting lightly upon his head, another upon his right shoulder, two arms were around his waist, then about his knees, and something like a shadow which was passing from above him with celerity.

"What devil is this?" he inquired of the harreteros, who were going down at his side.

"It is Tildio, Amo."

"Demon of a boy! Then of me he has made a ladder!"

"Tildio, Tildio, bravo!" shouted the harreteros.

In fact, the child had heard Leon's whistle, which was a call to him, and stepping here upon a head, there upon a shoulder, next upon a knee or another head, and propping himself as he could, he was descending with velocity by a truly human ladder. It was enough to make one's head swim to think of it.

#### On the Outside

The director followed, giving orders. Newly arrived people were assisting. The pumps were throwing water which was running through a rivulet near the patio and which was supplied from the drains of other mines, as well as by the tiro of Santa Lucia. The bottom of the shaft of San Miguel, by which the people were descending, was formed like a half orange or semi-sphere—ample, vast, spacious—into the upper part of which disembogued the lower part of the tiro. Two galleries were separated by this species of arch that were parallel to each other, and which communicated by twelve or fifteen canyons. At the opposite extremity was the tiro of Santa Lucia. The gallery to the right was the works of La Luz, the other the Preciosa. In the latter, the lining of wood was burning, and at the end of the works were eighty men who had no possible way of retreat. The communication of the shafts, moreover, by means of the galleries, furnished air to the fire, which was beginning to consume everything.

Leon, Henry, the mandon of the Preciosa, Tildio, and the greater part of the harreteros were grouped on the planes (lowest works) of the shaft of San Miguel. After descending three hundred vertical varas it is necessary to take breath. In front of him, the whole canyon of the Preciosa was on fire. A reddish brilliance filled the mine and communicating canyons, casting upon the works of La Luz a golden reflection and torrents of sparke, which appeared trombas of brilliant and rhnies.

#### Sometimes Tongues of Fire Issued.

Dilating, dazzling, twisting and licking along the walls of the canyons, forcing back the men who were trying to cover them with rubbish in order to smother the fire, but the partly subdued flame would redouble itself and continue devouring the gallery in which it was made prisoner, and the floor of which was covered with a river of living coals that were sparkling with a sinister crackling. At intervals the smoke was concealing or dulling that vision, appearing afterward with new and dazzling magnificence.

"This is superb!" exclaimed Leon. "Do you not feel yourself an artist, Henry?"

"No," replied the latter. "I only feel moistened."

"It is a hell in miniature, but notwithstanding, it is magnificent!"

"It needs devils," added Henry.

"What more devils than our passions!"

"We are losing time, Leon; we have not come here to philosophize."

"It is a question of esthetics, and esthetics is, so to say, the temperament of my soul. Besides, I was giving these poor people a chance to regain their breath."

As if these words

#### Might Have Fanned the Fire,

It darted a long gold-colored flame in the direction of our young men.

"Let the mandon take a number of men and stop up the entrance of this gallery, and the rest follow me," said the young man, rushing through the work of La Luz, and followed by three hundred men.

Then began a great struggle. The men attacked the Indians' god, the fire. It seemed to possess a will, an intelligence, a being. In each one of the canyons that they were trying to choke up, an arm of flame was extended and a hundred or more men were driven backward as if they were only one. The fire was doubling upon itself, appearing afterward more vigorous through another canyon. People continued en-



tering by the tiro of San Miguel and distributing themselves in the works of La Luz. An hour afterward a thousand men could not extinguish the fire that two hours before was but a spark. In the midst of the roaring of the flames, of the crackling of the burning wood, of the incessant hissing of the coals, of the blasphemous and songs of the barberos, the voice of Leon was heard calling out:

"El Tildio—where is Tildio?"

The search was useless. He had disappeared. "Poor child!" murmured Henry; "his life was a hell and his tomb is the same—poor Tildio!"

(To be Continued.)

### Lower California Gold-Fields.

We take the following from the San Diego Union:

The mining excitement continued unabated yesterday, and the discoveries made in the new El Dorado below the line were talked of everywhere. Women as well as men have got the craze, and a number of the gentler sex mixed in with the crowd that examined specimens and talked gold mines at the corner of Sixth and F streets. Several prospectors who returned from the lower country on the steamship Carlos Pacheco this evening before, put in an appearance early, and were compelled to tell the stories of their discoveries over and over again to seekers for information. The stories were all to the same effect, that the discoveries are fabulously rich, and the country between Ensenada and the Gulf is one vast bed of mineral.

#### Rich Placers and Ledge.

Richard Day, an old Colorado miner, who has been mining about twenty miles east of San Rafael since January, arrived on the Pacheco. He leaves on the return trip this morning, taking with him machinery to operate his claim. Mr. Day stated that in the section he came from the placers are very rich and the quartz ledges are simply marvelous. During the year he was in Colorado he never saw anything to compare with the virgin prospects in the lower country. The placers thus far have been worked principally by the dry-washer process with good results. Mr. Day himself has been developing a quartz ledge, but near to where he is at work men are working placers and are averaging \$10 a day to the man. Mr. Day showed samples from his ledge, which are marvelously rich in gold.

W. J. Riffenberg, a capitalist, who knows the lower country thoroughly, said, when asked regarding the discoveries, "It is the richest mineral country I have ever seen. About seventy miles from San Quintin there is a mountain of gold. Men must not go into this country with the expectation of seeing huge nuggets come rolling down the hill to them. They must go there with the expectation of, and tools with which to do hard work. Otherwise they will be disappointed." Mr. Riffenberg is an old miner, was in Colorado and other excitements, and speaks of the discoveries in Lower California as marvelous.

#### A Mountain of Gold.

Milton Santee, who with his son did surveying work on the Real del Castillo last February, said that he found a ledge of quartz of extraordinary thickness and very rich in gold. Croppings from the ledge could be plainly traced for a long distance. Settlers in the vicinity of Real del Castillo reported that rich placer and quartz leads existed all through that mountain. During the week of their stay at the Real, the Santees saw people constantly arriving at the store with small sacks of gold, which they brought to exchange for coin, and also make the necessary purchases of provisions.

This morning the steamship Carlos Pacheco sails for the Lower Coast. She will carry a full complement of passengers, most of whom are prospectors and mining men seeking investments.

#### Three Enthusiastic Miners.

Three miners named White, Moore and Sanford, who arrived yesterday morning from the lower San Quintin district, brought with them rich specimens of quartz which will average \$26,000 to the ton. They were enthusiastic over the gold prospects, and returned to Ensenada last night in order that they may equip 15 or 20 donkeys with supplies and camp fixtures and return to their mines at once.

Tia Juana, "the Gateway to Mexico," has, since the gold excitement, put on an animated appearance. Teams cross the line for the South every 10 or 15 minutes, and many of the residents of the place are preparing to join the begira.

**LEACHING.**—White Pine News: Messrs. Featherstone & Reynolds of the Keystone Mining Company left for Cortez last Saturday to inspect the leaching works at that place. They will obtain estimates of the necessary plant for a small mill of five or six tons daily capacity, which they will erect at once to test the process. If they can successfully work their ore they will build a large mill next year. They have one of the largest mines in Eastern Nevada, and would have no difficulty in keeping a large mill running.

CONSIDERABLE prospecting will be done in Jefferson district, Nev., this summer, and important mineral discoveries will very probably be made. A boom in this district is now in order.

### The Twin Leaf.

Many housewives who had a predilection for "roots and yarbs" in their old homes east of the Rocky mountains, will recognize the plant of which we give an engraving on this page. It is ranked as a native medicinal plant by Dr. Vasey of the Department of Agriculture, and is included in an enumeration of such native plants in a recent publication by him. The common names are "twin leaf" and "rheumatism root." Its scientific name is *Jeffersonia diphylla*, the genus bearing the appellation of the distinguished statesman, Thomas Jefferson.

Twin leaf is a small herbaceous perennial, of the order *Berberidaceae*. The rhizoma or root-stalk is thick and short, emitting a mass of matted fibrous roots. From the root-stalk is sent up a number of long stalked, erect leaves, the leaf and stalk when mature being a foot or

AGRICULTURAL OR MINERAL.—In the action of Hunt against Steese in ejectment, the Supreme Court has reversed the order of the lower court, refusing to grant an injunction, and directed that the injunction be issued in the plaintiff until the final hearing, when the propriety of either dissolving it or rendering it perpetual will be determined according to the merits of the case. The land involved in the suit was purchased as agricultural land from the Central Pacific railroad and used as such for several years prior to defendant looting a portion of it as mineral land. The land in question has not been finally decided in the lower court as agricultural or mineral, and the injunction is granted until that question is decided.

IRON WORKS.—A Portland, Ogn., dispatch dated April 25th says: A special from Ellensburg, W. T., stated to-day that arrangements had finally been made between the Northern



TWIN LEAF OR RHEUMATISM PLANT—*Jeffersonia diphylla*.

more in length. The leaf is curiously parted into two halves, giving rise to the name "twin leaf." As a whole the leaf is round-ovate in form, with the base deeply heart-shaped. When mature it may be six to nine inches in diameter. It is smooth and with the margins entire or wavy-toothed. There are three to five principal veins to each half, which proceed from the point of junction and ramify to the surface. The flowers come from the root on one-flowered naked stalks (scapes), which rise nearly to the height of the leaves. The flower has about four linear-oblong sepals, which drop off upon its opening; within these are eight oblong white petals, three-fourths to one inch long, and spreading and soon falling off. There are eight stamens, one before each petal. The ovary is roundish-oval, one-celled, becoming obovate, and when ripe opening at the top by a transverse lid. This plant grows in rich, shady woods, from Western New York to Wisconsin, and sparingly southward along the Alleghany mountains. It is most abundant in the Western States, from Ohio to Illinois and Kentucky. It has a popular reputation as a stimulant- tonic, especially for the cure of rheumatism.

**BIG STRIKE AT UNIONVILLE.**—Reports come from Unionville that Fred Heyde and Frank Hoenstein have struck a very fine ledge between the old town and Cottonwood. The ore is rich in gold as well as silver, and the prospect is said to be one of the best ever found in Unionville.—*Silver State*.

Pacific and the Moss Bay Steel Co. of England for establishing extensive steel works in this country. Work will begin soon. The iron company agrees to furnish traffic for a branch line to the extensive iron mines of the Upper Cleburne river. It will take a year to construct the works, which will give employment to several thousand men.

AN Eastern trade journal says: "Copper has developed a strong buoyant tendency, but the temporary cornering of the available supply will soon be dissipated, and the present squeeze will be followed by a return to normal values. Notwithstanding the firmness of copper and the alleged scarcity of spot supplies, consumption, both here and in Europe, is falling off in consequence of high prices."

THE shipbuilding at the foot of Sixth street appears to be progressing. The new 1000-ton steamer for the Newport Coal Co. is almost finished, while the Point Lohos and National City have been launched and are ready to receive their engines.

THE 60 stamp mill built for working low-grade ores of the Montana Co. cost \$143,346. Its first year's work resulted in a gross output of \$517,457.

THEY now have 30 machine air-drills at work in the Drumlunnon mine, representing a manual force equal to 360 men if drilling by hand,

### Geology as Applied to Mining.

Stephen Barton of Visalia, Cal., has published a little work entitled "A Rigid Earth being devoted to Geology as Applied to Mining." In his preface he says: In treating of geology as applied to mining the author has been prompted by the hope of contributing aid in arresting a class of mining explorations which have generally ended in disaster to the miner, and which he believes will continue to do so. If our hodies hear any relation to a melted interior other than as a part of the earth, that fact remains to be proven, notwithstanding the fidelity the miners of the Pacific Slope have shown as disciples of the igneous theory. Let the reader draw a picture of the energy exhausted, the hopes blighted, the millions squandered, in a vain effort to connect the source of rich deposits with the effects of fusion. Reared amid the busy scenes of a mining community, a half century of close observation in the mines of New Jersey, Wisconsin and California has served to convince the author that heat was not an agent in the formation of our hodies; and only in instances, and in slight degree, an effect. The suggestion is therefore presented that the theory of a melted interior has no foundation in scientific truth, that there is no loss of heat—either by the earth, the spheres or the system, and that this universe itself reposes on a stable structure.

Mr. Barton devotes separate chapters to continent-making, igneous action, glacial epochs, caloric, radiation of heat, the earth under the spectro-scope, the atomic theory, fossils in California, trends and reliefs, formation of oxides, electric currents, formation of our hodies and electro-chemical elements. The work embraces a review of accepted theories, as well as the author's own ideas and conclusions. It is the purpose of the work to notice the proof on both sides of the argument of some of the mooted questions, and to inquire, among other things, how far the evidence sustains the accepted theory of the radiation of heat into space. Mr. Barton admits that "scientists may regard the foregoing as being too much at war with established theories to be accepted. It will be remembered, however, that there are many perplexing phenomena which accepted theories fail to elucidate." Mr. Barton's concluding remarks are as follows:

Metal-bearing veins do not extend below the beds of the deeper river gorges, neither at those points nor at points intermediate "where there are high hills," as J. Ross Browne would say. Hence, veins do not continue to grow wider with depth. To recapitulate, then, as follows:

1. Precessional motion arises from a diagonal weighting of polar regions.
2. A wearing down of mountain chains has lessened precessional motion, and at the same time filled in the deep-sea connection with polar regions, thus changing the climate of high latitudes.
3. The prime equivalent ratio of affinity of caloric is changed by light and friction.
4. Veins are thrown in the direction of their obtuse angles as the result of a rigid interior of the earth.
5. Metal bearing veins do not penetrate the earth one mile below the water-line, nor cut below the deep-river beds of California.
6. The sun's rays do not exhibit the phenomena of ordinary combustion.
7. The oldest of known rocks are sedimentary.
8. There is no evidence of a former higher temperature at the equator.
9. The phenomena of tides is based on the philosophy of a rigid earth.
10. Periods of disturbance elevate coast-lines; periods of repose depress them, and, therefore, the theory of folding is at fault.
11. The rule that high coast-lines face the broader oceans applies best to the larger islands.
12. The trend of mountain formations is sometimes at right angles with coast-lines.
13. Electric currents are the base of the magnet, and encircle the surface of the magnetic earth, running from west to east.
14. All the phenomena of the metal-bearing veins may be produced by electro-chemical action without the aid of heat.
15. The timber used in mines becomes charged with gold by electro-chemical action.
16. Gold and roscolite form in the contact fissures between aqueous formations.
17. The observed facts show that the crushing force met with in stone quarries is in the direction of the axis of mountain chains, and not from the sea.

Hence, we conclude that the theory of a melted interior of the earth is without foundation, and that the forces employed in forming ore hodies only act near the surface.

WM. W. HARPER, for several years foreman of the Cons. California and Virginia, will shortly leave for Australia to accept a position under W. H. Patton at the Broken Hill mines.

THE copper mines in Esmeralda county are about to be operated by a New York company. These mines are near the C. & C. road, and are not far from the Sodaville station.

AT Oregon City a plant for the manufacture of cement is being put in at a cost of \$40,000. The rock is found in Douglas county, and is said to be inexhaustible.





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## SAN FRANCISCO

Saturday Morning, May 5, 1888.

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## Business Announcements.

[NEW THIS ISSUE.]

Gates Ore Crusher—Pacific Iron Works.

See Advertising Columns.

## Passing Events.

Another dividend-paying mine has been added to the Comstock list. The Hale & Norcross has declared a dividend for the first time since 1871. It is thought that Savage will be the next one to follow suit. The Comstock production is very rapidly increasing, and is now up to about a million a month.

The decision by the Board of Supervisors to require a 90 degree fire test for all petroleum used for fuel in this city will work a hardship to the manufacturing interests. Heretofore the liquid fuel used here has been only up to the 80-degree test. The difference makes quite a serious item in the expense of refining the oil.

The development in the Divoll or Bonanza mine in Tuolumne county shows the possibilities of the "pocket" mines of that region. Several pockets have previously been found in this mine, and the yield has been very large.

The establishment of smelting works in San Diego is a new enterprise. Sampling works are also being erected, and a blast-furnace for iron ores. Experience elsewhere has proven it to be the best plan to first open and develop mines, before putting up reduction works.

LAST week the State Mining Bureau received a fine collection of British Guiana woods, consisting of 72 samples.

## The Apex versus the Square Location.

A long-pending suit for a valuable mining property, located in Aspen, Colorado, has just been settled, not by the finding of a court or jury, but by an agreement come to between the parties contestant. This suit has excited great interest in mining circles, not so much on account of the value of the property in controversy, estimated at between ten and fifteen millions, as for the reason that the case involved the consideration of the Apex law in its application to mineral-bearing lodes. When we read the dispatch announcing that the case has been settled by compromise, we were almost led to exclaim: "Of course; how could it have been rationally disposed of in any other way, seeing the interpretation of this enigmatical law was involved in its settlement. Contemplating the judicial proceedings had in this case, there looms in our thought a cloudy and shapeless form, the incarnation of ambiguity, perplexity and doubt—a something growing out of the frantic efforts of the court and the jury to reconcile the irreconcilable and adjust the inadjuable.

Presumably this Aspen trial was attended by the incidents and events common on occasions of this kind, all here reproduced, maybe, in aggravated form. There was, we may suppose, the usual array of witnesses and experts on either side, the testimony of one set so nearly counterpoising that of the other, that it would be impossible for even the most experienced jurist to detect a preponderance either way, this diversity of opinion so going to every fact connected with or having the remotest bearing on the case. The frame of mind induced by attempts at reconciling these conflicting views and through long wrestling with this apex proposition, with its end-line and side-line commitments, were easier conceived than described. "Confusion worse confounded" fails to express it. Little wonder these litigants, after several years' experience in the courts, concluded to settle their differences in the extra-judicial manner related. And yet such defeat of legal remedies is not due so much to incompetence on the part of these legal functionaries or other defect in the machinery of justice as to the imperfections of the state itself, the very ground principle of which there is reason to fear is radically wrong. How could the judicial mind comprehend the incomprehensible, or the bewildered jury flounder in a sea of uncertainties arrive at an intelligent conclusion or any conclusion whatever?

The expediency of this so-called Apex law has, from the time of its enactment, been seriously questioned in the most authoritative quarters, some of those best qualified to judge of its fitness having condemned it in the strongest language. That its enforcement has in many instances been attended with great inconvenience and even much hardship, cannot be denied, nor is there much doubt but it is becoming generally unpopular with a large portion of the mining community. It may well be in fact, that in adopting this new and unusual method in taking up lode mining claims instead of the square location, as is the practice in all other countries, we grievously blundered. If so, the mistake, should it become clearly apparent, ought to meet with early correction.

William M. Stewart, Senator from Nevada, himself, by the way, author of this Apex Bill, introduced into the Senate a day or two since a number of amendments to the existing mining law, all judicious and much needed. We suggest now that he go further, and reconsider the policy of repealing this statute with which there is such wide discontent, and substitute in its stead the plan of square locations, that elsewhere has been so generally adopted and found to work so well.

THE Utah smelters are enlarging preparatory for an increase of business. The Mingo Furnace Co. have just finished putting in a 50-horse power Corliss engine, a pair of flange steel boilers of 60-horse power each, and Westinghouse incandescent electric light plant and a 25-horse power Westinghouse engine.

ALL the mills anywhere near Virginia, Nev., are now hammering away on Comstock ore, except the two California mills, which are awaiting certain alterations in their motive power. Although all the mills are at work there are still mines that are unable to obtain facilities for the reduction of their ores.

## Mining Keeps Well to the Front.

Thus far the present year's conditions have been generally favorable to the mining interest, the prospect now being that the output of hullion for 1888 will largely exceed that of any preceding year in the history of the Pacific Coast. Should nothing occur to change the favorable aspect of the situation, this is sure to be the case. From all parts of our mineral domain, encouraging reports come to hand. From Alaska to Mexico, and from mid-continent to the ocean, the mining industry is in a healthful condition, some branches of the business, more especially coal and copper, being unusually active and prosperous. Silver mining, under the efforts that are being made to relieve it from some of the obstacles that have long tended to depress it, is also looking up, its friends being encouraged to hope that these efforts, though some have already been defeated, will not all fail of their object. That the Lower House of Congress should, at the instance of the gold-bugs, have felt constrained to nullify the silver-issue provision of the Beck bill, has been a grievous disappointment to the advocate of the white metal. Despite all this endeavor to disparage silver, its constant growth in popular favor indicates an early revival in the business of mining for that metal. Though it may for a time continue to lag, there is little doubt but this industry will ultimately recover much of its former importance if its restoration be not complete.

Because land values in California are being advanced at an unprecedented rate, and greatly increased attention is here being paid to agricultural pursuits, it must not be inferred that the business of mining is falling into decadence or that our mineral products are suffering a decline. Even in this State, mining is undergoing a steady expansion; in fact, almost keeping even pace with our agricultural progress, while in most other parts of the Pacific Coast it continues the leading and all-sustaining industry. Deprived of this, the population of more than half the territory west of the Rocky mountains would wane year by year, and its wealth soon shrink to a tithe of its present proportions. But for their store of the useful and precious metals, Idaho, Montana, Utah, Arizona and Nevada, would have only their scanty pasturage and slender agricultural resources to relieve them from the imputation of being mere sage barrens that so long rested upon them. It is due chiefly to their mineral wealth that the legend "Great American Desert," formerly written over these countries, has since been expunged from the map.

While we have no idea that anything will ever occur tending to show that the confidence reposed in the agricultural resources of California has been misplaced, we appreciate that our mines are only secondary to our lands as sources of wealth, and that they will for centuries to come richly reward the capital and labor invested in them, and this with quite as much certainty as investments made in lands. Hardly more than a month ago it was calculated that we should this year gather a bountiful crop of the cereals in California. To-day the estimates, owing to an absence of the usual April showers, are reduced by a third, with a danger of further shrinkage before the reapers get to work. When the year shall have been ended it will be found that we have garnered of gold, silver, coal, lead, copper, borax, quicksilver, etc., the expected crop, which not only in this State but in all the Pacific States and Territories, can with certainty be counted upon. While the grain-grower, the drouth having done its worst, lives still in dread of "the north wind's breath" and the danger of insects, hogs and worms, coupled with the rabbit and the bird pests, and innumerable forms of plant disease fills the mind of the viticulturist and horticulturist with apprehension, the miner, relieved from these fears and little dependent on the seasons for success, contemplates the future with little anxiety, well knowing that while there may occur individual cases of failure, good results are assured as a whole.

SENATOR STEWART has introduced a bill to require the purchase and coinage of not less than \$4,000,000 worth of silver bullion per month.

C. H. AARON is looking at the Julian, Banner and Cuyamaca gold mines, San Diego county, in the interest of the State Mining Bureau.

## The Lower California Mines.

There has been so much published in the San Diego papers concerning the gold mines in Lower California, that the excitement concerning them is something more than local. But the stories from there are so sensational in character that people who have had any experience in such matters will not readily accept them without further inquiry. Ore worth "\$1000 a ton," old mines "which have yielded a million," a true vein "which experts pronounce far more promising than the great Comstock in the early days," etc., are all stock phrases which have been used in all excitements, and are used now in this. The rich gold field is said to extend over 600 square miles, and to have many valuable ledges. There are also dry placers. The country is sparsely populated, and the distances between towns great. The mountains are unproductive of food, and supplies must be carried.

There have been several "excitements" in Lower California, but none of them have panned out very well. It is to be hoped that this one will, however, though it is best for poor prospectors to consider carefully before they go. The people of the South are not by any means unanimous as to the richness or extent of the gold fields. The Julian (San Diego county) *Sentinel* says: "The late mining excitement in Lower California will soon be laid away beside the many fizzes dotting the pages of the history of mining booms. Any person with ordinary common sense ought to see the sordid motives that agitate these booms. No doubt there are large quantities of gold hidden away in the secret caverns of the Mexican mountains, but it has been there for some years, and it will stay there long enough for all to get front seats who want them, so don't be in too great a hurry. But we are a little anxious to know how the San Diego newspapers are going to descend from their high position in this dishonest scheme. It is said that the fine samples exhibited as coming from this new El Dorado were mined in the Pacific and Julian Mining district in this county."

## Electric Power.

The use of electric power is rapidly increasing. The San Francisco Tool Co. of this city, which started to furnish electric power with a small Keith dynamo, have kept adding to their facilities as demand required, and have just put in an 80-horse power dynamo of the same make. This is in addition to the others. They furnish power for several small factories within a few blocks of their works, and are now arranging to run elevators, printing presses, etc., where heavier power is required.

The California Electric Light Co. has been preparing to furnish power in addition to light for some time. The company is now furnishing electric motors, from one-horse power up to 100-horse power, in any part of San Francisco. The power is available for printing presses, manfactories, operating pumps for elevators, etc. There is no investment required by the user, as the company furnishes motor and attendance.

In Oakland a company has also been started to furnish power. The large presses of the Oakland *Tribune* are now run by electricity, and the *Times* is also utilizing it in its press-room.

For two years past the MINING AND SCIENTIFIC PRESS has been urging the mining community to take up this power for hoisting-works, mills, concentrators, pumping, etc. There are many places where it could be used to great advantage. A Pelton or Knight wheel or a turbine at any convenient water-power stream within a few miles of the mine or mill, would give all the power for the dynamos. There are hundreds of places in this State where this system could be utilized.

In cities and towns the power will be of great use to many manufacturing establishments, where a central station supplies the dynamos and motors. No fireman or engineer is needed. There is no coal-dust, fire risk, smell or smoke. The motor occupies little space and scarcely any attention. It is possible to have machinery at distances from manufacturing centers, and even in dwellings. We expect to see this electric power very generally utilized within the next few years. The expense is small as compared with steam in most cases.



## Bank Blasting.

In blasting gravel banks in such places as hydraulic mining is carried on in this State, the ordinary method is as follows: A drift is run in from the face on the bottom of the deposit a distance proportionate to the height of the bank and the character of the ground to be moved. From the end of this drift a cross-drift is driven each way, forming a T. The cross-drift is charged with kegs of powder, and the main drift is securely tamped by filling it up solid with the material which has been extracted, and the powder is exploded by a time fuse or electric battery. In some instances where the ground is "heavy and hard" several cross-drifts are made. The amount of powder used is determined by the position, character and height of the bank, a quantity sufficient only to shatter the ground being employed.

The arrangement of the powder chambers for a 1201-keg blast made by the Smartville Hydraulic Mining Company some years ago, is shown in Fig. 1 of the accompanying diagrams, taken from Bowie's "Hydraulic Mining in California."

X was a shaft 74 feet deep, from the bottom of which the main drift, A, was driven 185 feet. The cross drifts, B, three in number, were driven at distances respectively of 70 feet, 120 feet and 170 feet from the shaft, X. They extended each 20 feet on one side of the main drift, and 40 feet on the other side. The several drifts marked C are called "lifters." Each "lifter" was 15 feet long. The total length of the drifts aggregated 570 feet. They were 2½ feet wide and 3½ feet high. The cross drifts were charged with 1201 kegs (25 pounds each) of black powder. The main drift was securely tamped from the shaft to the first cross drift, a distance of 70 feet. The powder was simultaneously ignited by electricity at 12 different points.

The ground moved was 270 feet long, 180 feet wide, with an average depth of 100 feet. The cost of the blast was about \$6000.

At a blast in the Paragon mine, Placer county, where 700 kegs of powder were exploded, the arrangement is shown in Fig. 2. The main drift A was tamped for 75 feet from the near end, and the cross-drifts tamped 10 feet each way, a space being left in the lifters for the expansion of the gas generated by the explosion of the powder. The drifts were 4½ feet high by 5 feet wide, and the bank was 150 feet high. The blast was fired by electricity, and the ground covered by the drifts was thoroughly shattered.

At the Dardanelles hydraulic and drift mine, near Forest Hill, Placer county, a blast was made with 36,400 pounds of Judson powder (old), shattering about 500,000 cubic yards of cement gravel. The gravel bank had a face of some 1200 feet in length, with a height of 175 feet. This deposit reposed on a rising bed-rock. Five parallel drifts, 180 feet apart, were run in from the face of a length of 70 feet each. From the end of each of these drifts two arms (right and left) or crosscuts were driven 70 feet long, thus leaving a space of 40 feet between the ends of the crosscuts from the several main drifts. The powder, in 50 pound boxes, was charged in lots of 1000 to 1500 pounds in the different chambers. In each chamber three exploders were placed in the powder, each exploder being carefully connected by an insulated copper wire, with the main wires on the outside of the drifts.

The drifts were all well tamped with clay and boulders. The wires from the exploders connected outside of the main drifts with two copper wires from an electro-magnetic battery which was situated to the right and about 200 feet from the face of the bank. When everything was ready the blast was fired. The back-ground was raised bodily four or five feet, and the face was thrown forward. At the Blue Tent mine, Nevada county, in 1880, a bank 200 feet high was thrown down with 43,000 pounds of powder.

The Porterville Enterprise is a new journal published at Porterville, Tulare county. The publisher is Edward P. Dewey, for some ten years a faithful foreman and assistant foreman in our office. He has produced a good-looking paper, which shows noteworthy attention to local news. The paper is independent in politics, and is printed in a growing section of the great valley of California. We wish Mr. Dewey every success with his publication.

**HYDRAULIC NOZZLES.**—Hydraulic miners are, most of them, aware of the long-pending litigation between F. H. Fisher and Joshua Hendy, plaintiffs, and R. Hoskin, defendant, on the subject of "gists" for hydraulic min-

GEORGE OHLEYER has gone East in the interest of the Anti-Debris Association, and presumably for the purpose of endeavoring to defeat the Biggs bill, introduced in Congress to provide for an investigation of the debris prob-

FIG. 1.

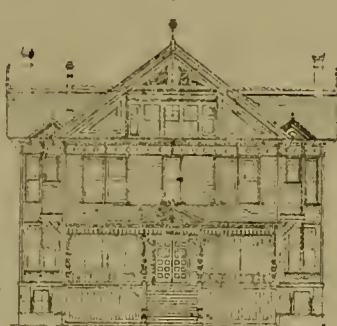


FIG. 3.

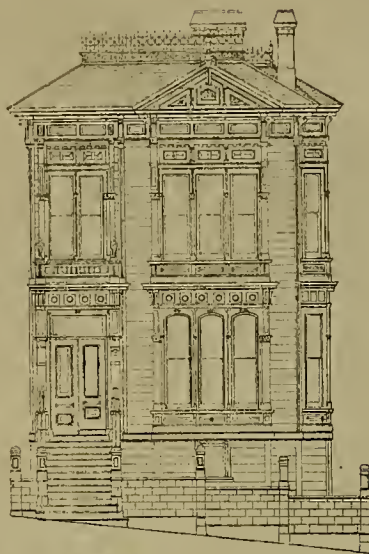


FIG. 2.



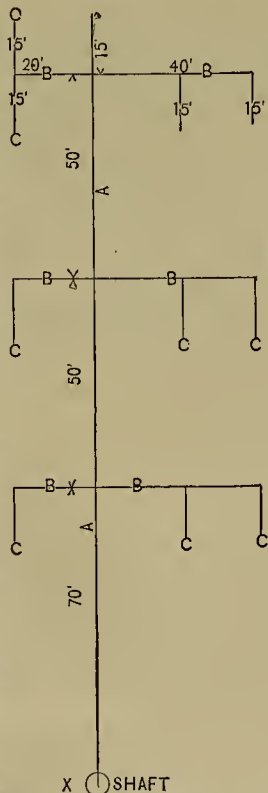
MODERN DWELLING HOUSES.

ing purposes. Judge Sawyer decided against Hoskin, and sustained Fisher's reissued patent, and Fisher has been collecting royalties. The case was appealed, and a correspondent informs us that the Supreme Court of the United States

lem in California. What objection can there be in having it investigated by a competent and disinterested government commission?

GOVERNOR WATERMAN and State Mineralog-

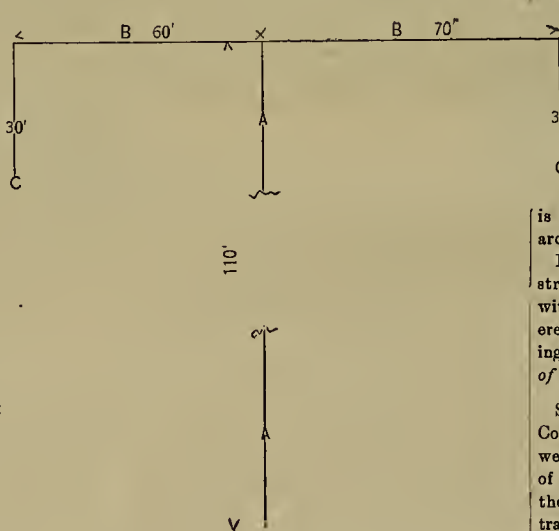
FIG. 1.



X SHAFT

ARRANGEMENTS OF DRIFTS AND CROSS-CUTS FOR BANK MINING.

FIG. 2.



on the 29th of March decided that Fisher's reissued patent is void, and has ordered back the case to the United States Circuit Court with directions to dismiss the suit with costs to the plaintiffs. This decision is a very important one and will interest many miners.

gist Irelan are looking at oil prospects in San Bernardino county.

DURING the month of March Hale and Norcross shipped hullion valued at \$144,211.24, of which \$71,490.22 was in gold.

## Reduction Works at San Diego.

The San Diego Reduction Works Co. has been organized, with a capital stock of \$50,000. The President is W. G. Rwenberg; Vice-President, T. J. Daly; Secretary, Richard Garvey; and Treasurer, J. D. Hanbury. The company has secured a lease of one-half of block 88, in Cleveland's addition, on Ninth street, and work has commenced. The grounds are 300 by 150 feet. The contract for the buildings is let. A portion of the machinery for the new smelting and reduction works has already arrived, a smelter is already on the ground and a five-stamp sampling mill is now on its way.

A blast furnace is to be put up on the Coronado beach, to work ore from iron beds on the Atlantic and Pacific road, about 200 miles from San Diego.

The smelting furnaces of the Reduction Works Co. are intended, so it is said, to work copper ore from the mountains back of San Diego.

The people in the southern part of this State are very enterprising, and it is possible that these new works are adjuncts to the mining boom recently caused by gold discoveries in Lower California. Up in this part of the State we have been unable to make any money smelting iron, even with big capital, and furnaces right alongside of the iron-ore beds, and in San Diego they are going to haul the ore a couple of hundred miles, and fuel must also be transported. Furnaces for smelting copper are generally put up close to the mines, but in this instance the ore must be brought to the furnace, as there are no properly developed copper mines in that county. There is plenty of copper ore in Lower California, and perhaps that is to be utilized. Information concerning the whole plan is not very accurate, as we are told by the dispatches that the little mill mentioned above is to crush 50 to 100 tons of ore a day. We can't make five-stamp mills do anything like that in the upper part of California.

## Modern Dwellings.

We give on this page engravings of some of the types of dwelling-houses now being built here. These residences were designed by John J. Clark, architect of this city. Fig. 1 represents a building now being erected in East Oakland. It is a two-story, basement and attic frame, and contains 12 rooms, consisting of parlors, reception-room, library, kitchen, dining-room, chambers, etc., and necessary chamber closets, pass closets, chute, dumb waiter and all necessary modern improvements. The total cost, when ready for occupation, will be \$8200.

Fig. 2 is a building that was erected last summer in Ross valley, Marin county, at a total cost of \$6000. It is a two-story frame with basement and attic, and contains 12 rooms, the first floor containing parlor, sitting-room, conservatory, dining-room and kitchen, the second floor containing the chambers, bath and dressing-rooms. The basement and attic contain the coal-room, storerooms, servants' and trunk-rooms, respectively. The house contains all the latest modern improvements and is designed in the Queen Anne style of architecture.

Fig. 3 is a city residence erected on Oak street, San Francisco. It consists of 12 rooms, with all the modern improvements, and was erected at a total cost of \$6120. These engravings were made by the San Francisco Journal of Commerce.

SEVERAL HUNDRED miners employed in the Con. California and Virginia mine gave a farewell send-off to William W. Harper, foreman of the above mine, who left with his family for the Broken Hills mining district, South Australia, in response to a cablegram from W. H. Patton, late superintendent of the Bonanza mines. Harper was presented by the miners with a gold-headed cane with a diamond setting.

The Comstock has been regarded as dead a half dozen times, but still it rallies, and this time with more real merit, perhaps, than it ever had before. Tuscarora and Enreka have each passed through like dark days, but both are again showing great mineral wealth. But the Comstock is the wonder of all mines of which the world's history furnishes an account.

EARTHQUAKE shocks were felt at a number of towns in California on Saturday last.



## MECHANICAL PROGRESS.

## The New Puddling Process.

Further Advance in Iron Manufacture—Another American Invention.

We have already made brief allusions to a new puddling process by which the iron is made to pass directly from the blast-furnace to a machine puddler where it is puddled and converted into blooms without any reheating. For some four or five months the experiments with this new process have been in progress at the Milwaukee works of the North Chicago rolling-mill.

The successful use of a similar direct process in the South Chicago Steel Works, says the *Iron Age*, led the officers to believe that it would be feasible in the puddling department of their Milwaukee iron works. It was no more necessary, they argued, to remelt iron for a puddling furnace than for a steel converter. At first one puddling furnace was tried, with satisfactory results, then an additional furnace was used, and in time others were added, until there are now, and have been for two weeks, four double puddling furnaces in regular operation upon this plan.

The results thus far accomplished have been very satisfactory, showing an improvement in every respect over the old method of operating puddling furnaces. The quality of the iron produced is most excellent. No difficulty is experienced in securing a uniform quality of metal from the blast furnace.

So far as known this is the first successful attempt in puddling blast-furnace metal, and the North Chicago Rolling-Mill Company may well feel proud of their achievement. They have inaugurated

## A New Departure in Puddling

Which is fully as important in its way as the revolution of the rail trade in this country, in which they were also the leaders. On the 24th day of May, 1885, this company rolled the first Bessemer steel rail ever rolled in the United States. The officers of the company feel that they have accomplished a very important step in the manufacture of iron, and one which will assist it to hold its own against the inroads of soft steel for purposes to which iron is well adapted. The company is not yet prepared to furnish a full statement of the results developed by the new process in comparison with the old.

## The New Process Described.

The following is a brief description of the new process, as described by one who is evidently familiar with the same: The liquid metal is brought from the blast-furnace to the puddle-mill by a small locomotive. The ladle holds about 4400 pounds, which is enough to charge two puddling furnaces. The metal retains its heat sufficiently, so that there is no risk of damage if there happens to be some little detention on the way. The ladle at present is mounted on an iron frame boggy, tilted by means of gear. A scale has been arranged on the boggy, so that the contents can be almost accurately weighed when pouring. The metal requires about an hour for the complete process of making ten balls. By the old way it requires two hours. The time occupied for the usual five heats of a turn is now just eight hours. At present but two turns are made in 24 hours, but it is probable that in time, should it become necessary, three turns can be made, which will increase the output 50 per cent.

There seems to be no special difficulty in working the new process. The surplus metal at the blast-furnace is run off into the pig beds once a day, and seems to be of as good quality as before the direct puddling process was introduced. Sufficient data have not yet been obtained, but it is estimated that thus far a saving of nearly one-fourth of the fuel used by the old process has been effected. It is expected, however, that the saving will eventually be greater than this when the workmen get thoroughly expert in the new form of puddling. The metal thus far obtained is much cleaner than by the old way, owing to the fact that pig iron takes up considerable sand from the beds in the casting-house. The tests of bar iron made from the new process have not been completed as yet, and no report can be made. This new puddling process is attracting much attention all over the United States, and in Europe as well, as will be seen by the following item which recently appeared in the *London Iron and Trade Journal* under the head of

## The Decline of the Puddler.

While we are not among those who think that the decline of "fistic" abilities among the English people is a sign of increasing milk-sopism, we are always pleased to note any change in machinery or system that tends to make men less and less machines of the monotonous drudgery kind. Many kinds of manual work are about as unvarying as the tread round of a gin-horse, while other handicrafts are unsuitable for human beings. Among the latter description we notice that Sir Charles Palmer classes the occupation of puddler. Speaking of progress of steel, he remarked that they had come to the conclusion that steel had superseded iron, and the old puddling system was entirely, or almost entirely, done away with. He could not regret the dispensing with the puddler, as he would rather see him elevated by education, improved by science, and made a first-class intelligent skilled workman than put before the

furnace and roasted until his constitution was destroyed. This is all very nice from a philanthropist's point of view, but we should prefer to see progress delayed rather than have it stimulated by sentiment. The puddler's work is heavy, but we deny that he is unskilled, and heat is not so serious on the health as the steel advocates assert.

**MAKING OLD STEEL RAILS NEW.**—Mr. W. B. Middleton, manager of the Penn Iron Works, Lancaster, Pa., has discovered a method of welding steel which promises to confer very great benefit upon those engaged in steel-working. According to specification of the invention, which has been patented in the United States and leading foreign countries, pieces of steel may, at a proper welding heat, be perfectly, cheaply and easily welded together after the pieces to be welded have been coated with a solution of silicate of soda or other solution in which silica is contained. In the practice of the invention, the most satisfactory results have been obtained by applying a solution of silicate of soda to the pieces of steel to be welded, by dipping the pieces in the solution, or by pouring it upon them, bunching together the pieces to be welded and heating them to an ordinary welding heat and then passing them through rolls. This is the process followed with large pieces, but smaller articles can be welded under the hammer when treated previously with the solution. The inventor finds that the process is applicable for reworking old steel rails and other heavy pieces; and it renders certain kinds of steel scrap highly valuable which formerly were almost worthless. Experiments under the process have been made on an extensive scale at the Penn Works, and the results indicate that something like a revolution in the manner of handling old steel is pending. Arrangements are making to treat masses of steel with the silicate solution on a large scale, place them in the heating furnace, and then pass them through the rolls, thereby turning old rails into new ones that will be as good as the first product of the steel ingot. The inventor of this valuable process is a brother of Mr. Harvey Middleton, superintendent of motive-power of the Louisville and Nashville Railroad.—*National Car and Locomotive Builder*.

**A NEW PROCESS OF ELECTRICAL WELDING.**—A new system of electric welding has been perfected by Dr. Bernardo of St. Petersburg. The process of electric welding hitherto practiced for joining bars, etc., is the device of Prof. Elihu Thomson of Boston, Mass., and depends upon causing the bar to be traversed by an alternating current of electricity powerful enough to fuse the metal at the point of resistance caused by the break of continuity. In the new system, however, a continuous current from a charged accumulator is employed. The metals to be joined are attached to the negative pole of the accumulator, and a carbon pencil, such as is used in ordinary arc lamps, is connected with the positive pole of the battery. The result of bringing the carbon pencil into contact with the metal, and then slightly withdrawing it, is to start an electric arc, which fuses the metals at the desired joint until they run together. Carbon blocks may be used to retain the molten metal in its place, and sometimes a little sand is used as a flux. In this way boiler plates can be welded in situ, blow holes in castings filled up and iron rods joined. Thus it appears that the new welding process is very like lead burning, the carbon pencil in its portable holder playing the part of the gas blow-pipe in the latter process. It remains to be proved by tests whether this system is good for working with, or whether it is destined for shop and foundry use in doctoring flawed iron work.

**NEW METHOD OF MELTING IRON.**—A new method of melting iron has been devised in Germany. The cupola is supplied with blast through two tuyeres, one above the other, there being 18 in each set; the tuyeres are ports, with the form of a vertical slot, and are directly connected with a tuyere ring. The particular feature of the cupola is that the bottom is a slightly inverted arch, which is pierced by two openings, through which both blasts, or rather imperfectly consumed gases of combustion and the fluid, can flow. Below is a small chamber in which the iron collects. It is heated by the gases forced downward from the cupola above, these being supplied by the necessary air for combustion by a special tuyere leading to the main pipe, the chamber at the same time serving to pre-heat, scrap, etc., which need only to be pushed into the bath for dissolving it. Of course, considerable quantities of scrap can be used by directly charging an ordinary cupola, but it is claimed in this case the advantages presented are economy of fuel, and a greater facility for making sharp, strong castings, and a purer description of metal.

**SHAFTS DISPLACING BELTS.**—Quite a number of factories in the East are discarding the use of belts to convey power from one floor to another. In their place they run a vertical shaft from the top to bottom of the building, connecting each floor by bevel gears on quarter-twist belts. This is done to prevent accidents from clothing catching in belts; also prevents its forming a draught for fire. The shaft can, of course, be fitted in a box in the floor, with no place to catch skirts or aprons, and no air-passage for draught.

## SCIENTIFIC PROGRESS.

## Scientific Methods.

Scientific methods bear the same relation to intellectual progress that tools, instruments, machines, mechanical contrivances of all sorts, bear to material progress. They are intellectual contrivances—indirect ways of accomplishing results far too hard for bare-handed, unaided intellectual strength. As the civilized man has little or no advantage over the savage in bare-handed strength of muscle, and the enormous superiority of the former in accomplishing material results is due wholly to the use of mechanical contrivances or machines, even so, in the higher sphere of intellect, the scientist makes no pretension to the possession of greater unaided intellectual strength than belongs to the uncultured man, or even perhaps to the savage. The amazing intellectual results achieved by science are due wholly to the use of intellectual contrivances or scientific methods. As in the lower sphere of material progress the greatest benefactors of the race are the inventors or perfectors of new mechanical contrivances or machines, so also, in the higher sphere of intellectual progress, the greatest benefactors of the race are the inventors or perfectors of new intellectual contrivances or methods of research.

To illustrate the power of methods, and the necessity of their use, take the case of the method of notation, so characteristic of mathematics, and take it even in its simplest and most familiar form: Nine numeral figures, having each a value of its own, and another dependent upon its position; a few letters *a* and *b*, and *x* and *y*, connected by symbols  $+$  and  $=$ ; that is all. And yet, by the use of this simple contrivance, the dullest schoolboy accomplishes intellectual results which would defy the utmost efforts of the unaided strength of the greatest genius. And this is only the simplest tool form of this method. Think of the results accomplished by the use of the more complex machinery of the higher mathematics!

Take next the method of experiment so characteristic of physics and chemistry. The phenomena of the external world are far too complex and far too much affected by disturbing forces and modifying conditions to be understood at once by bare, unaided intellectual insight. They must first be simplified. The physicist, therefore, contrives artificial phenomena under ideal conditions. He removes one complicating condition after another, one disturbing cause and then another, watching meanwhile the result, until finally the necessary condition and the true cause are discovered. On this method rests the whole fabric of the physical and chemical sciences.—*Popular Science Monthly*.

**SPECULATIVE FANCIES.**—We have had the age of stone, of bronze, of gold, and of paper; the age of condensation may be looming in the future; and at a fashionable dinner party, some time in the 20th century, the entire menu for 20 guests may be put into an egg cup placed in the center of a table otherwise heaped with apparently natural flowers, but in reality artificial ones, scented by means of tabellæ of condensed odors, ravishing to the olfactory nerve, but extracted from the homeliest substances, such as tallow, Thamea mud, garlic, cow cabbage, eel and decayed fish. And when the guests have regaled sumptuously on *disca* representing hord-d'œuvre, eoup, fish, entrees, roasts, sweets and dessert washed down by sherry, claret and champagne *disca* dissolved in water, they may go to the play by means of the telephone, and listen to the songs of the Patti of the future through the medium of the phonograph. Some of the guests will, of course, fly home; others, more indolent, will step into their balloons or hail a passing parachute. So we may progress and progress, and continue condensing and condensing, until some day or other we condense ourselves, and become so many microscopic *disca* not much bigger than the grains of dust to which all humanity is bound to return.—*London Telegraph*.

**WHAT IS INSTINCT?**—The instincts are memories that have become organized in the central nervous system of the man or other animal, and which are transmitted from the ancestry as well defined as are the form, or features of the countenance, or the peculiarities of the thoughts and disposition. As may be inferred, the instincts are principally useful as conducive to the general welfare of the race or animal, but are cultivated only to a limited extent, and that with difficulty, as seen notably in the lower animals. Cultivation in man is something outside and not connected with the instinct—something which is not found at all in the lower animals and therefore cannot be improved in them.

**"WEATHER."**—Ralph Abercromby has written a book under the title of "Weather," which constitutes a popular exposition of the nature of weather changes from day to day. Weather science is now attracting a great deal of attention. The methods of forecasting the weather have themselves been reduced to something like a science. The meteorologist, by the aid of the telegraph, learns all about the prevailing wind currents, the temperature, the state of the barometer over a large area. He is able to predict the weather in a given place with tolerable accuracy for about 48 hours in advance. The book treats of cyclones, pâm-

peros, whirlwinds, tornadoes, thunderstorms and the sources of heat and cold. There are 96 illustrations. While the author aims at a popular exposition, most of the chapters are crowded full of data derived from all sources, ancient and modern. Indeed, all the known facts and phenomena are brought together and an attempt made at classification. The signal offices, meteorological offices and societies at home and abroad have been laid under contribution for data.

**GRANITE IN GLASS-MAKING.**—A glass sand company, up in the State claims to have successfully experimented in grinding granite obtained on the long range of the somber Shawangunk mountain, and the result promises to revolutionize at least one part of the glassmaking business. Heretofore a certain kind of sand has been necessary in making glass, but the experiments made show that granite is an excellent substitute. The company is fitting up its works, and several of the stones to be used as bed plates to grind the flinty granite to powder weigh over 15 tons each. Work has been somewhat delayed by the recent collapse of a bridge under the weight of one of the immense stones referred to. Two more of these immense stones have been hauled from the quarries in the mountains to a dock at Kerhonkson, and upon the opening of navigation on the Hudson and Delaware canal they will be taken there by boat. The Shawagunks have a national reputation for the millstone product, but 15-ton single millstones have never been used until now. The sand powder which is to be made from the flinty granite costs little or nothing.

**ORIGIN OF WESTERN TORNADOES.**—Of 600 tornadoes of which record has been made in the United States, not more than 75 were east of the Alleghany mountains. These terrible displays of natural energy result from the excessively warm air of the lower Mississippi valley being violently forced northwardly until it meets with a similar violent movement of air coming down from the polar regions. The two rapidly moving currents on meeting are forced into gyrotory tornadoes, of limited extent, which sweep with destructive violence across the level prairie country where they meet. The place of meeting is oftener in Missouri or Kansas than in the region further north. But wherever such opposing violent winds meet, a tornado of more or less violence is the result. The Alleghany mountains serve as quite an effective barrier against storms of this description on the Atlantic Slope.

**COMPRESSED WOOD.**—An account is given in the Nevada papers of some beautiful specimens of solidified pine wood which, strange to say, were taken from the 1500 foot level of one of the mines in that country. The wood, having been compressed by the operations of nature to one-fourth its normal size, is as firm and close-grained as boxwood, and consequently takes a fine polish. On being thus treated, it appears and feels so exactly like petrified wood as to be at once mistaken for such on being seen and examined for the first time. The material, when polished, is of a deep chestnut color, and, though brought to its present condition by exposure to 160° of heat, under immense pressure, for a period of some 12 years, it is thought that the same effect might be brought to pass in a few days by means of suitable processes of compression, and the substance made serviceable in useful industries.

**SOME OF THE LESSONS OF THE STORM.**—The recent storm, by which New York City was cut off from intercourse with the rest of the world, afforded a striking reminder of the intimate connection between labor and subsistence, and should be a valuable object-lesson for those who are disposed to despise labor and defy mere wealth. A practical demonstration was afforded of the fact that the man who possesses millions in the form of bonds, mortgages, notes, etc., is only better off than his poorer neighbor to the extent that he may be able to secure actual and real values represented by them, and that if, for any reason, labor is rendered impossible or its immediate products unavailable, he is as helpless as the poorest; perhaps more so. The condition brought about by the storm need only have lasted a few days longer to have carried the illustration to completion.

**VELOCITY OF ELECTRICITY.**—There is, as Professor Thompson remarks, no assignable "velocity of electricity," as this must vary with the current and the conductor. Wheatstone, in 1833, seemed to show a transmission velocity of 183,000 miles a second through copper wire, but in late experiments signals were sent over ordinary telegraph wires on poles and had a rate of only 14,000 to 16,000 miles. With wires near the earth, the velocity was 12,000 miles, but reached 24,000 on very high wires.

**PRESERVING BUTTER.**—The export of butter to countries of which the climate prevents its home preparation has long been a hope in the chemical mind. This seems now to have become possible by a discovery of Pierre Grosfils of Vervier, who finds that a solution of a small amount of salicylic acid in lactic acid, when mixed with the butter, will keep it indefinitely without altering its properties or impairing its taste.

**THE FIRST ECLIPSE** upon record was a lunar one, and was observed at Babylon 721 B. C.



## GOOD HEALTH.

## Female Physicians in New York.

There are 150 female physicians in New York, and the number in Brooklyn and the surrounding cities about doubles that. Among those in New York City there are quite a number who have incomes of \$10,000; two or three make yearly sums ranging from \$15,000 to \$20,000, and one has averaged for the last four years a steady income of \$25,000. Dr. Emily Blackwell is the President of the Woman's Medical College, and has besides a large practice. She has adopted children and makes a charming home for them. Dr. Mary Putnam Jacobi has a large clientele, and consults with the first male physicians of the city; indeed more than one physician has a regular female conferee, to whom he recommends some of his patients to go for special courses of treatment. Several of these female practitioners are house physicians to hospitals, and the Lucretia Mott Hospital in Brooklyn is entirely officiated by them.

Some women physicians work in partnership with each other, among whom are Dr. Eliza M. Mosher and Lucy M. Hall of Brooklyn, and the two sister doctors, Sarah and Julia McNutt. Dr. Sarah has charge of the babies' ward of the Post Graduate hospital, and Dr. Julia has founded a training school for nurses. Both are physicians in high standing, and have a large practice, especially among children. Dr. Annie Daniels and Kate Parker are both women of influence and of the widest-reaching charity. Dr. Elizabeth Cushman is a celebrated anatomist and successful ovariotomist, and yet is a small, feminine, quiet-voiced little woman. Drs. Lozier, Post, and Faunce are all well known for good work. Without exception, these women are quiet, well bred, gentle-mannered and soft-voiced. One lonely young woman, whose physician was of the same sex, said a short while ago: "When I am homesick and miss my mother, I go and talk ten minutes to my dear doctor, and I come home quite happy again."—*N. Y. World.*

**A NEW TREATMENT FOR BOILS AND CARBUNCLES.**—In a communication to the French Academy of Medicine, at a recent meeting, M. Verneuil says: The topical applications (prominent among which stand the carbolated and borated solutions) employed in a certain way, and particularly in the form of powder used repeatedly and for a long time, are of remarkable efficacy, and at the same time are absolutely harmless and easy of application. These applications of powder, with few exceptions, arrest the progress of the disease in the gravest cases, ordinarily cause the pains to quickly cease, reduce the fever, disinfect the purulent and gangrenous centers, hasten resolution and promote the formation of healthy granulations. This treatment is suitable for all regions, and for all forms and periods of the disease. It is never harmful, and leads to a cure in a large number of cases. It assists surgical interference when that is necessary. Finally, it tends to prevent auto-inoculation and general infection.

**A NEW ANTIDOTE FOR RATTLESNAKE POISON.** On the morning of March 29th, says the *Indiana Farmer*, Mr. M. B. Smith, who works in a Southern Express office, at Atlanta, Ga., was bitten by a rattlesnake that lay concealed in a crate of cabbage. As he placed his hand upon the snake he felt a stinging sensation in one of his fingers and saw that a huge snake had fastened its fangs in his flesh. In a few seconds the hand and arm began to swell and Mr. Smith was driven hurriedly to Dr. Gaston's office. Dr. Gaston saw the young man was in danger of losing his life and he gave him a hypodermic injection of permanganate of potash—a solution of two grains to a dram of water. This antidote to snake poison was first used by a Brazilian physician, and its efficacy was so great that the doctor was given a handsome reward by the Government. The treatment relieved Mr. Smith immediately and he was sent to his home. From last accounts he was doing well. Dr. Gaston is of the opinion that Smith would have died but for the timely antidote administered.

**INSECTS IN EARS.**—Few troubles are more annoying or more productive of serious difficulty, if not removed, than insects in ears. Lying upon soft meadow grass, or sleeping upon a camp-bed of fragrant eucalyptus, bugs of different denominations seem possessed with a desire to inspect our auricles. Once inside, their frantic efforts to escape cause such agony that people have gone temporarily crazy with it. This may be instantly stopped by pouring the ear full of sweet oil, which suffocates the insect, and he is easily removed later by a syringe and warm water. Avoid intruding pins, etc., into the ear. Much harm may thus be done to their delicate mechanism, and little to the cause of all the trouble. If oil is not readily accessible, use water, which is almost as good. Earache in any form may be quickly relieved by filling the organ with chloroform vapor from an uncorked bottle, vapor only, not the liquid.

**HOT WATER TO RELIEVE THIRST.**—It is a mistake to suppose that cold drinks are necessary to relieve thirst. Very cold drinks, as a rule, increase the feverish condition of the mouth and stomach, and so create thirst. Experience shows it to be a fact that hot drinks relieve thirst and "cool off the body when it is

in an abnormally heated condition better than ice-cold drinks." It is far better and safer to avoid the free use of drinks below 60 degrees; in fact, a higher temperature is to be preferred; and those who are much troubled with thirst will do well to try the advantages to be derived from hot drinks instead of the cold fluids to which they have been accustomed. Hot drinks also have the advantage of aiding digestion, instead of causing debility of the stomach and bowels.

**NEWLY BUILT HOUSES.**—According to the *Medical Press and Circular*, at the town of Bihe, in Switzerland, a decree has been put in force prohibiting the occupation of houses within four months of their completion. As recently as the earlier part of the present century, in the north of England, custom, though not law, required the lapse of 12 months after completion before a house could be tenanted. It has been estimated that a modern brick dwelling of medium size requires about 10,000 gallons of water in its construction, much of which is still present when the workmen withdraw. Heat is of less use in getting rid of this moisture than free ventilation. We must not fail to add that to light gas in rooms with a view of drying them is a capital mistake, since all the hydrogen in the gas is converted into its equivalent of water, every part of hydrogen thus consumed yielding eight parts of water in the state of vapor.

**CHIEF CAUSE OF COAL MINE FATALITIES.**—Mine-inspector Williams' statistics for 1887, for the First Anthracite district, show that the main cause of mine fatalities is falling roof and coal, as the following will show: Deaths by explosion of gas, 6; by fall of roof and coal, 28; by crushed and run over by mine cars, 11; by explosion of powder and blasts, 3; by miscellaneous causes, inside, 7; outside, 11; total, 65.

**WATER IN THE GROUND.**—Extended observations at Paris and at Munich indicate that the sanitary condition of a locality depends on the amount of water contained in the ground. The years in which there has been a large quantity of ground-water present have invariably been the healthiest, while those in which there has been a smaller quantity have invariably been the unhealthiest.

**THE HOT-WATER CURE.**—The results of the hot-water cure are said by a physician to be the stimulation of the stomach at first, but after repeated use a lessening of the tone of the digestive tracks, which causes constipation and dyspepsia. Hot drinks tend to lessen bronchial irritation, and may be used profitably in some cases of consumption.

**RAILROAD ACCIDENTS.**—A French writer says the percentage of deaths and wounds from railroad accidents is only about one-quarter as great in Europe as in the United States.

## USEFUL INFORMATION.

**PROFESSIONAL DUSTERS.**—That dusting has been made a difficult household art by the accumulation of bric-a-brac in our houses, says the *Boston Journal*, is proved by the new occupation of bric-a-brac cleaning. It is known that in New York, women who clean ornaments go from house to house, making a remunerative employment for themselves. They possess a delicate touch, and have especial brushes for the purpose. The chief fault of amateur dusting is the haste with which it is done. Look at the duster in a large crockery store. She wipes each article with a cloth, carefully and slowly, and when necessary, polishes the surfaces thoroughly. Her leisurely manner is in great contrast with that of the average housemaid, who whips her cloth rapidly over the surface. A visitor to Holland says that the weapons of a Dutch cleaning woman are cloths and chamois, "brooms and brushes, scrubbing brushes for the floors, hair brushes for the wainscots, feather brushes for the walls, tooth brushes for the corners, geese wings for the stoves, hens' feathers for cleaning out the keyholes, small sticks of wood for poking the dust out of cracks in the floors." It is no wonder that the Dutch house is harnessed brightly.

**UTILIZING WOOD.**—The recently-invented process by which wood is made to take on some of the special characteristics of metal has been turned to practical account in Germany. By this process, the surface becomes so hard and smooth as to be susceptible of a high polish, and may be treated with a burnisher of either glass or porcelain; the appearance of the wood being then in every respect that of polished metal, having, in fact, the semblance of a polished mirror, but with this peculiar and advantageous difference, namely, that, unlike metal, it is unaffected by moisture. To reach this result, the wood is steeped in a bath of caustic alkali for two or three days together, according to its degree of permeability, at a temperature of between 164° and 197° Fahr. It is then placed in a second bath of hydrosulphate of calcium, to which a concentrated solution of sulphur is added, after some 24 or 36 hours. The third bath is one of acetate of lead, at a temperature of from 95° to 120° Fahr., and in this latter the wood is allowed to remain from 30 to 50 hours. After being subjected to a thorough drying, it is in a condition for being

polished with lead, tin or zinc, as may be desired, finishing the process with a burnisher, when the wood apparently becomes a piece of shining, polished metal.

**A DEAD BLACK PAINT.**—Probably many of our readers, especially those who are the possessors of optical instruments, have, at some time or other, been in need of a "dead-black" paint or varnish for brass work, such as tubes, diaphragms, etc. We have often been in the same boat, and all the formulae and recipes given in the books were unsatisfactory because of their vagueness. The following can be relied upon to give a first-rate dead-black, and it is easily made: Take two grains of lampblack, put it into any smooth, shallow dish, such as a saucer or small butter-plate, add a little gold-size, and thoroughly mix the two together. Just enough gold-size should be used to hold the lampblack together—about three drops of such size as may be had by dipping the point of a lead pencil about half an inch into the gold-size will be found right for the above quantity of lampblack. It should be added a drop at a time, however. After the lampblack and size are thoroughly mixed and worked, add 24 drops of turpentine and again mix and work.—*Mechanical and Milling News.*

**A FULFILLING SOAP.**—Take 50 pounds of pure caustic potash and add to it about 90 pounds of water. The potash will dissolve immediately and make a hot lye. Allow this to cool. Add this lye with constant stirring for a few minutes until thoroughly mixed, to 20 gallons of cotton-seed oil mixed with 20 pounds of melted tallow, the whole being brought to a temperature of 90 degrees F. Then leave this mixture in a warm room for two days well wrapped up, to keep in the heat caused by the gradual process of saponification and combination which takes place. Again stir the stiff mass and leave for a day or two more in a warm place, when the saponification will be complete, and the result a stiff soft soap, nearly neutral, ready for use.

**A NEW NON-INFLAMMABLE MATERIAL.**—Pyrodene is a new liquid which renders wood, textile fabrics, paper and such inflammable materials fire-proof. The liquid is made of all colors, so as to be used as a substitute for paint; and it is said to render houses and out-buildings fire-proof. It was used for fire-proofing the woodwork of the recent Jubilee Exhibition at Manchester. Washable water-paints called "aqual" are also produced by the same inventor, T. Griffiths, F. C. S., and they can be applied direct to metal work. They contain no oil and may be washed with water, while, on the other hand, they do not blister in the heat of the sun. The paint is stated to be not more expensive than ordinary paint.

**EXPERIMENTS IN MARCHING.**—The experiment, begun some time ago in the German infantry, of doing away with socks and keeping the soldiers' feet well greased, has proved thoroughly successful. To say nothing of the economy of the plan, the men march easier, and, generally speaking, show few blisters. So, too, lifting the feet high; the regulation step now is said to make the most awkward Pomeranian or Hanoverian peasant fairly surefooted, while before its adoption 25 per cent of such men would stumble in a charge over rough ground, and about 10 per cent fall.

**THE POPULATION OF THE PACIFIC COAST,** by a careful estimate, is set down as follows:

California	1,250,000
Oregon	270,000
Washington	150,000
Nevada	75,000
Utah	200,000
Idaho	100,000
Montana	130,000
Arizona	90,000
Colorado	250,000
New Mexico	150,000
Total	2,665,000

**VALUE OF A BOBBY.**—The business man with a bobby that he rides is a happy man; but if the hobby rides him his business will suffer sooner or later. The man without a bobby will be found in the club room, the billiard-room or the card-room. The bobbyist, with his lot of pigeons, his birdskins or eggs, his bugs and beetles, takes more substantial happiness than all the members of the biggest-toned clubs in any city combined. Besides that, home and Dame Nature is all the world to him.

**A TRAIN OF CARS ON THE STAGE.**—The London *Engineer* tells of a theater there upon the stage of which steel rails are laid and a real locomotive draws a train of cars over them. The locomotive is steamed up, the engineer is at his post, and there are all the other accessories of a train of cars. What now perplexes the editor is to decide whether the man at the throttle is an actor or engineer.

**PENNSYLVANIA PETROLEUM.**—It is a singular fact that Pennsylvania petroleum, which was the first in the world to be developed, is superior to any that has since been found on any part of the globe. Compared with the oil produced in Northwestern Ohio, Canada, Russia or California, the Pennsylvania is far superior.

**TO PREVENT MILDEW.**—A solution composed of alum 2 pounds, water 60 pounds, blue vitriol 2 pounds, gelatine 1 pound, acetate of lead  $\frac{1}{2}$  pound, all thoroughly mixed, will prevent mildew from affecting wood, clothing, fabrics, etc.

## ENGINEERING NOTES.

## All-Rail Route to Asia via Alaska.

Russia is building two great commercial and strategic railroads through her Asiatic dominions. One of these roads is pointing southward through Afghanistan to—where no fellow can find out. Perhaps to the Arabian gulf or some other point on the Indian ocean, at present outside of Russian dominion. The other road is pushing eastward through the entire length of Russia in Asia, to some point on the Behring strait. The completion of this road would strongly hold out the idea that in the very near future a great iron belt from this side of the world will meet it half-way, and that travel by land from the New World to the Old will have been accomplished. Great railway corporations are now seriously looking into this, as it seems a stupendous project, but in reality not as great an undertaking as many people believe. The country that will necessarily have to be crossed in Western British Columbia and Central Alaska is far from being the frigid zone that many believe it to be. The line would undoubtedly, in its course north, strike the headwaters of the Yukon river, then keep down that mighty stream to within, perhaps, a hundred miles from the coast, at or near Nulato, where it would leave the river, and, running nearly west, would terminate at Cape Prince of Wales, within about 50 statute miles of the Siberian coast. A ferry across the straits at this point would be but a small affair.

Very little difficulty, except perhaps in crossing the ranges at the headwaters of the Yukon, would be apprehended from the deep snows in winter. The climate along the Yukon is dry and but very little snow falls there—from 18 inches to perhaps two feet in depth. Extreme cold, from 70° to 80° below zero, only prevails during about two months of midwinter, and this would be the greatest drawback to winter travel. Immense forests skirt the route nearly to the coast; about midway down the Yukon are perhaps the greatest coal banks in the world. Branch lines would tap the coast settlements and the rich mineral section of the interior. With such a fair country before them, remarks the *Alaska Free Press*, it would be wonderful indeed, in this enlightened and progressive age, if work is not commenced on such a line within a very short time.

**THE VALUE OF A GOOD ENGINEER.**—Quite a number of years ago an engineer took charge of a plant consisting of nearly a dozen engines, with over 2000-horse power of boilers. The plant was an old one, got together from time to time, according to the necessities of the concern, without much regard to economy either in its make-up, maintenance or operation. An agent was engaged for the concern who had sense enough to see that a good engineer could save a large amount of money in the power account, and a suitable man was engaged. He took charge, and although his salary was considerable, and his responsibilities much greater in magnitude than those of many who adorn an office, he put on his overalls and a slouch hat and went into that plant for all there was to be got out of it. He had old stuff to work with, and had to get along with what he had, but by a thorough study of the possibilities and the means at hand, and the application of sound practical ideas and common-sense methods, he reduced the expenses for power in that concern 42 per cent, and during his stay of nearly five years no portion of the mill was ever required to shut down or lie idle by reason of accident or failure on the part of any of the engines. He further submitted a plan for the rearrangement of the plant which would, figuring on a liberal basis, effect a saving which would pay an interest of 10 per cent on its cost.—*Ex.*

**THE PANAMA CANAL.**—It appears from late telegrams from Paris that De Lesseps is quite sure to obtain the sanction from the French Chamber of Deputies for his desired lottery scheme, which it is thought will furnish all the funds necessary for the completion of the Panama canal. The committee which has the matter in charge will make a favorable report, and advises that the canal company be authorized to raise 350,000,000 francs on the lottery plan. In the meantime active work is in progress on the Nicaragua canal, which will be completed some little time in advance of that at Panama. With these two water-ways between the two oceans, cheap freights and comparatively rapid water transit will be inaugurated, which will prove of immense advantage to California, and still further help on the new era of progress upon which the State has entered.

**A LONG TELEGRAPH WIRE.**—A very remarkable engineering feat has been achieved in China, in the face of extraordinary physical difficulties. It was the stretching of a steel-wire cable of seven strands across the river Lunann by the Danish engineer de Linde, assisted only by unskilled Chinese labor. The cable extends between two points at a distance of 4648 feet apart. The height of the first support is 417 feet above the present level of the river, and the second 737 feet. This Chinese cable is the longest in the world except one, the cable across the Kistna measuring 5070 feet. Two cables across the Gangee are 2900 and 2830 feet long respectively. Another, crossing the Hooghly, is 1312, and another in the United States, across the Missouri, is 2000 feet long.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**MIDDLE BAR TUNNEL.**—Amador Ledger, April 28: The big tunnel enterprise at Middle bar has come to a standstill with the prospect of a long period of idleness before it. The practical results from this huge undertaking are nil. A hole has been bored into the hill a distance of 2800 feet, at a cost of not less than \$100,000. This vast work has done absolutely nothing toward proving or disproving anything of practical value in the mineral development of that section. In the prosecution of mining upon the small veins which exist in that locality, the owners are just as much at sea as to the best and most economical method to pursue as though this tunnel did not exist. It affords no guide to others and has certainly proved only an expensive bore to the owners. It was run in the nature of a prospect tunnel, on a scale large enough for the operation of a great mine; but the mine has not yet shown up and the tunnel remains a monument to a foolish and costly experiment. If it has tended to prove anything, it is what was contended all along in regard to this peculiar mining district, namely, that gold-bearing ores are found in small but rich pocket seams. But whether any rich quartz ledge with well-defined walls exists here, as in other portions of the Mother lode, is a question still undetermined. The Zelle mill resumed operations last Sunday.

**SUTTER CREEK.**—The four men who took a lease of the Lincoln mine have abandoned their contract, as they could not find the pay rock that they anticipated. S. D. R. Stewart has just returned from San Francisco, and in all probability he will put some men to work on the mine in a few days.

**PLYMOUTH.**—The Consolidated mine is still waiting for the fire to go out. The New London is working as usual and all of the smaller mines in the neighborhood are busy.

#### Calaveras.

**REED.**—Calaveras Prospect, April 27: The Reed mine is expected to start up soon. It is rumored that parties from San Francisco will take hold of it and it will be thoroughly prospected. John Rich informed a reporter that H. P. Robinson, W. T. Trible and himself are working the O. K. mine near Whiskey Slide. They are putting up an adit to crush rock from their mine, and we expect to hear of a good cleanup in a short time. A shaft has been sunk 12 feet on the lead and a drift 80 feet along the vein. The quartz will pay on an average of \$20 per ton, and the vein is four feet wide. Mr. Rich had a few specimens of rock with which he showed free gold without the aid of a glass.

**SINKING.**—William Ellis and Henry Spinola have been sinking a shaft on Central Hill near the Lava shaft on the old Muller claim. They commenced about three months ago and a week ago last Saturday struck through the lava into the channel. A large stream of water drove them out before they could get a pan of gravel, and the following Monday their shaft had 50 feet of water in it. The shaft is 143 feet deep, and Mr. Ellis informed the reporter that they intended to get machinery and pump out the water and ascertain what there is in the channel.

#### Contra Costa.

**COAL.**—Martinez Item, April 26: We learn that a coal prospect is being worked and developed on the farm of Mr. Francisco Galindo, about one mile from Concord, an expert prospector being now engaged in opening the vein. It is stated that a superior quality of coal indication is observable at the surface, and confidence is felt in the opening up of a paying vein of good coal. The prospect will be made near the place where the earthquake of 1868 caused an upheaval of the earth and escaping gas burned the grass for some distance around the opening. It has been suspected since that date that a valuable coal deposit was underlying the farm. The prospect will be watched with considerable interest.

#### Inyo.

**AT LOOKOUT.**—Inyo Independent, April 26: At Lookout Frank Fitzgerald has quite a force of miners at work; they are all working under lease and are doing well. Murphy & McIntosh who have a lease of the Lookout mines are doing especially well. Not long since Montana & Farnsworth took a lease of the furnace and ore dumps for six months. In 22 days they took out \$10,000 worth of bullion, and concentrations valued at \$1340. The two men got half the total proceeds giving them quite a sum for their labor.

#### Placer.

**FOREST HILL.**—Placer Herald, April 28: Thos. Sheridan is developing a quartz mine which promises to be richer than any other lode ever opened on the divide. The Pride of the Divide is located nearly half a mile west of his house and below the ditch. Mr. Sheridan has run a tunnel 110 feet in length, tapping the ledge at the depth of 65 feet. The ledge on this lead is two feet in width and very rich. The Gray Eagle Co. is busy putting in a third boiler, the two boilers in place not being sufficient power to raise the water to the surface. The Centennial mill is idle. Four men have been put to work on the Union tunnel, in Ferrier's ranch, below Todd's valley. This tunnel is supposed to be on the Big Channel lead, which is now bonded to the French company.

#### Nevada.

**COLUMBIA HILL.**—Cor. Nevada Herald, April 27: There are eight men working at the Grant mine pushing ahead the tunnel in hopes of striking a rich chute of ore. In a recent crushing of ore from this mine the tailings assayed \$20 to the ton, while not enough of the gold was saved in the mill to pay for working the ore. The gold does not amalgamate, and it is supposed the ore is something like rebellious Meadow Lake ore, and that some process other than the one now in use will be needed to save the gold. Concentrators will be put in this spring, and it is hoped that by means of them the gold can be saved. In the El Dorado mine there are five men at work. A small stringer of almost solid sulphurets was struck in the tunnel a few days ago which leads the owners to think the ledge is not far off. The tunnel is now in 330 feet, and the work is being pushed rapidly forward. When

the ledge is struck, it will confirm the opinion of expert mining men that this is one of the best sections in the State for quartz.

**COPPER MINE SOLD.**—Grass Valley Tidings, April 25: The San Francisco Company's copper mine, at Spenceville, has been purchased by Chas. Pietzsch, a Spenceville merchant, and O. Woehler. The last-named gentleman formerly superintended the mine, which, however, has not been operated during the last two years. Pietzsch and Woehler propose to work the property more extensively than ever, a course that will result in prosperity for Spenceville.

**STUCK GOOD GRAVEL.**—Nevada Transcript, April 27: S. L. Blackwell and John Cline have just struck some splendid gravel in their drift mine at Snow Point, above Moore's flat. They got \$27.50 worth of gold from five carloads of gravel.

#### Plumas.

**GOLD LEDGE.**—Plumas National, April 21: The Gold Ledge quartz mine, at Poplar valley, under the able management of Chas. Tork, the superintendent, is making good progress. There will be quite a force of men employed in a short time. The Consignee mine will be started up in a short time. A tunnel will be run to tap the deep shaft. Matt Peterson and Arthur Toole have started a tunnel in McDermott ravine, above Long valley, with the expectation of striking a rich gravel channel. Wiloughby & Jones are running their tunnel at Gold Lake night and day, and expect soon to strike the ledge. The croppings prospect very rich and they expect to strike a bonanza.

**QUARTZ.**—Greenville Bulletin, April 25: The quartz development at Wolf creek is reported to be increasing in size and value. We hope for the development of a big mine there. The Arcadia mill is now running on ore from the Drury mine, crushing having begun last week.

#### San Diego.

**JULIAN DISTRICT.**—Sentinel, April 27: The Julian mining district is now in first-class trim for producing the biggest mining boom that has ever occurred in Southern California, but our mines are too valuable to break our necks in encouraging any such suicidal excitement. Prospecting has been going on here for some time in a quiet way, and instead of making a big hurrah about the rich finds that have been made they have been kept quiet for various reasons, but before a fortnight passes, there will be announcements made through these columns that will make the eyes of the old forty-miners glitter. But we don't want any two weeks' rush followed by a sickening lull. We have the gold to induce capital to open up our mines in a permanent way and we can give the proof of the pudding.

#### Shasta.

**FIVE STAMPS.**—Redding Free Press, April 28: From A. J. Woodward we learn that the Celestine Mining Co. have purchased J. P. Rander's mining interest in Grizzly gulch, and will at once put on a force of men for the purpose of developing the mine, and will shortly erect a 5-stamp quartz-mill. The shaft is 80 feet in depth, with good ore in sight all the way down. Geo. H. Knox has some fine prospects in the old North Star mine; he has opened up the old company's tunnel, which is 400 feet in length, and is now running a crosscut to tap the ledge. E. L. Melbourne has struck a rich spot in the bed of Grizzly gulch, which yields well so far as prospected. C. S. Barnes has commenced operations on the placer mine formerly owned by Dr. Bell.

#### Sierra.

**DRIFT MINING.**—Sierra Tribune, April 27: At the Gibraltar claim, located at the head of Canyon creek, four miles east of Poker Flat, the company is preparing to start a new tunnel which will reach the gravel channel in about 400 feet. A tunnel has been run 500 feet by the company, but it was found to be too high, and therefore, useless. The Gibraltar is one of the most favorably located claims in the country, and the owners are sanguine that the channel for which they are running, will pay immense profits when it is reached. The Sunnyside claim, which is located at the upper end of the Gibraltar line, is proving a regular bonanza. The dividend company, whose claim lies on the same ridge and above the Sunnyside, will start a tunnel this spring. The Forest Queen owners will also prosecute developments upon their gravel claim this season. Mr. C. Keller, to whom we are indebted for the foregoing information, anticipates renewed activity in drift mining all through the northern portion of the county this year.

**YOUNG AMERICA.**—Cor. Mountain Messenger, April 28: Spring is making its appearance among us. The lower lake is clear of ice, and Upper Sardine will be in a few days. Everything moves smoothly along here. At No. 2 the main tunnel will be through the hill in about 200 feet more. The stops look well and put out their usual amount of rock. No. 3 is and has been for some time running on the ledge that steadily enlarges and prospects very well. Grade for a track and tramway is being made at No. 3 for transporting the quartz to the mill.

#### Trinity.

**GOOD PROSPECT.**—Journal, April 28: Messrs. J. N. Ames and M. R. Newman have discovered a good prospect in the Deadwood district, on the ridge above Jacob Paulsen's adit. The ledge yields about \$50 to the ton, is of good size and between well-defined walls. They have run a tunnel in on the ledge about 30 feet, which taps it at a depth of 20 feet, and it seems to improve as they prospect and develop it.

**EAST FORK.**—Journal, April 21: As spring opens, the prospects for a lively and profitable summer in the East Fork mining districts grow unusually bright. A good wagon-road is being built to the mines, and will be completed in time for summer travel. Already there are quite a number of men in camp, working the mines and prospecting; and prospectors are going in daily. Work is progressing on all the older locations with most satisfactory results. The quality of ore now being taken out of the Hardscrabble makes that mine a valuable property. It is rumored that the Golden Chest is about to sell and that a stamp-mill will be erected on the mine. It is a good property. With the erection of mills and the investment of capital, East Fork is bound to take a high rank, as a bullion producer, among the quartz camps of the coast. The camp offers a fair field for the capitalist and the prospector; to the capitalist it offers

a good opening for investment with the prospect of large returns; to the prospector it offers a large belt of mineral land but slightly prospected. There is a good opening there for thorough prospectors, and the right kind of men are heartily welcomed. We predict for the camp a lively season and a development that will astonish the Silurians.

**EAST FORK.**—Trinity Journal, April 28: The owners of the Enterprise are running a tunnel lower down than the one in which they have been working, which will give them about 60 feet of stopping ground. The tunnel will be about 100 feet long. The ledge is about 12 inches wide and is looking well. They are at present working six men. The Ozark, owned by Day & Moor, is showing as well as ever, if not better. They are stopping out ore and will start up their adit in a few days. It is rumored that the owners will erect a stamp-mill on their property during the summer. The Golden Chest is being worked by a force of about 12 men, and more will be put at work as soon as the proper men can be found who are willing to work and understand the business. This will probably be one of the big mines of California within a few years. The stamp-mill which the owners will put up this summer will be running about the first of August, when developments will be more rapid. Mr. Geo. Bailey recently sold one-half of the Esperanza location to Mr. W. R. Bigelow. The ledge is now 18 inches to 2 feet and prospects well. They will commence a tunnel in a few days to run in on the ledge and prospect as they go. Many other locations are promising well, and the summer season will see some of them bloom into rich mines, without a doubt.

#### Tuolumne.

**HOISTING WORKS.**—Sonora Democrat, April 28: The Hunter property in Hunter's canyon is undergoing development, and at the same time the company is erecting hoisting works.

**ELECTRIC POWER.**—The Buchanan Co. is examining the Tuolumne river with a view to the establishment on the river of electrical or air compressor works. From the mine to the river at the nearest point, the distance is about 3 miles, and the power to run the mill, hoisting works and Burleigh drills can be readily transmitted over this distance, and practically applied. The cam shaft of the Black Oak mill broke last week, and therefore the mill was idle this week. It is being welded by Romans & Cowie. This machinery came from San Francisco in the first place, and it is at once apparent that mill and machinery men ought on the score of merit to patronize home institutions, as the machinery from below ultimately breaks, and finds its way to the Sonora foundry.

**BELCHER.**—It is reported that the Belcher company, near Groveland, completed a crushing of quartz last week, with the new Kendall mill, and that the quartz paid very well. What is urgently required in that section is water, either for steam purposes, or for motive power. There is no doubt about the excellent class of mines there, and by all means power to work them should be obtained.

### NEVADA.

#### Washoe District.

**YELLOW JACKET.**—Virginia Enterprise, April 28: Are shipping 95 tons of gold-bearing white rock to the Santiago mill daily.

**HALE AND NORCROSS.**—During the week have hoisted 1524 tons of ore from the 600 and 700 levels, and have shipped to the Nevada and Mexican mills 1395 tons. The stops are looking well. Have bullion on hand and previously shipped this month amounting to \$103,000.

**SAVAGE.**—Are extracting about 90 tons of ore per day of good quality between the 400 and 900 stations, and are shipping 70 tons per day to the Rock Point mill. Have bullion on hand and previously shipped this month amounting to \$32,000.

**BEST AND BELCHER.**—On the 425 level the winze has been sunk 18 feet; total, 58. The formation is quartz, showing value by assay. The west crosscut from the top of No 2 upraise has been advanced 20 feet. The formation is quartz and porphyry.

**CHALLENGE.**—The Challenge-Jacket west crosscut on the 1000 level is in 16 feet, and the face shows quartz of a very favorable character. The raise is up on the slope a distance of 62 feet, having been advanced 22 feet during the week.

**UTAH.**—The west crosscut from the top of the upraise has been extended 50 feet; total, 140. This crosscut has passed through quartz and vein matter showing some value. The face is now in west country rock.

**CROWN POINT.**—The 600 level south drift has advanced 12 feet during the week; total distance from the shaft, 463 feet. The west crosscut on this level is out 160 feet, having been advanced 20 feet during the week.

**SEGREGATED BELCHER.**—The south drift from the raise has not been advanced since last report, the work done having been directed to repairing the 1300 level drift, in which good progress is being made.

**IOWA.**—The McBee tunnel has been advanced 13 feet during the week, and have started a south drift in quartz and vein matter. Have about 50 or 75 feet to run to get under the pay chimney.

**GOULD AND CURRY.**—During the week have extracted from the 250 and 300 levels and shipped to the Douglass mill 80 tons of ore, the battery samples of which average \$31.95 per ton.

**BELCHER.**—The raise from the 500 level to connect with the upraise from the 400 level of Crown Point has made connection and crosscutting will commence from that point.

**KEYES.**—The east crosscut is in very favorable spot porphyry. North drift running parallel and near hanging wall is showing some rich ore, assays running from \$200 to \$400.

**CONFIDENCE.**—Are now shipping to the Brunswick mill daily 184 tons of ore, the average battery samples of which show a value of \$40.59 per ton for the week.

**ANDES.**—Are drifting east on the 350 level. The face is in quartz. Are still drifting north on the 240 level in low-grade ore, with occasional spots of rich stuff.

**SCORPION.**—The south drift on the 300 level has been extended 25 feet, making its total distance 213 feet. The face is in clay and clay porphyry.

**WEST CON. CAL.-VA.**—Are sinking shaft and

making good headway. Preparations for erecting steam-hoisting plant is in progress.

**BULLION.**—Are crosscutting east from the new station on the 640 level and making good progress.

**CHOLLAR.**—North drift No. 2, on the 450 level, is in 490 feet in low-grade quartz now.

**POTOSI.**—The southwest drift on the 450 level is in 332 feet in clay and porphyry.

**OVERMAN.**—Shipping 40 tons of ore daily to the Vivian mill. It is of fair grade.

#### Aurora District.

**PROSPECTS.**—Walker Lake Bulletin, April 25: The hoisting works of the Durand mine at Aurora are now in running order, the snow has entirely disappeared, the roads have all been repaired and Aurora will soon be one of the most prosperous mining camps in Esmeralda. In fact, the prospects are brighter for a prosperous future for Aurora than they have been for 15 years. It is true that there has been considerable excitement at different times within the last few years, but it was all without foundation. Now the mines are looking better and have more good ore in sight than they have had for many years; the people are all cheerful and hopeful, and feel that better times are in store for that once illustrious mining camp.

#### Bristol District.

**WORK.**—Pioche Record, April 24: It is expected that work on the property of the Bristol Syndicate, at Bristol, will soon be resumed. C. L. Roe, who, since last September, has had the property under lease, has surrendered his interest, and all indebtedness incurred by him under the lease is to be assumed by the syndicate, a majority of the creditors agreeing to this. Work is to begin at once and an experimental run will be made in about 10 days. If this is satisfactory other machinery will be put in the mill, and development on the Mayflower mine resumed. All the present indebtedness is to be paid from the first proceeds realized. About 1500 tons of ore are mined, part of which is at the mill, and several hundred tons more are broken in the mine and ready to raise. C. L. Roe expects to leave soon for Utah where he will engage in leaching tailings.

#### Eureka District.

**CHARGES FOR WORKING ORES.**—Eureka Sentinel, April 28: Quite a flutter of excitement was caused throughout Eureka district last Saturday, upon the announcement that the Eureka Con. and Richmond companies had entered into negotiations to raise the charges for working side ores. For some time past these companies have been pulling and bidding one against the other, in order to secure the side ore mined in this and the adjoining districts. Ores that were valuable as smelting factors, containing large percentages of lead, have been worked for a very small consideration, or nothing, beyond the margin of discounts on gold and silver. These companies claimed that the side ores were purchased at a loss to themselves, and have consequently agreed that hereafter all side ores that shall be purchased by them shall be bought on joint account and divided, share and share alike. Maurice Delaney, who has been employed for a number of years as sampler at the Eureka Con. reduction works, has been removed to a similar position at the Richmond works, to represent the Eureka Con. Co., where all the side ores, except the fluxes, are to be sampled and settled for. After sampling the half of each lot it is to be removed to the Eureka Con. works. From and after the date of the new arrangement between the two companies, the following are the terms upon which side ore will be worked by them: Twelve dollars per ton will be charged for working all dry and \$10 per ton for all fat ores, which contain lead. The percentages on the gold and silver contents of the ores will be paid for according to the rates that existed before the agreement, viz.: 81 per cent of the market value of silver, and 80 per cent of the assay value of the gold. The lead contents are to be paid for on a graduated scale. Nothing will be paid for lead when the ore contains less than 10 per cent, but for all ores containing 10 per cent and upward, from 20 to 45 cents per unit will be paid for all the lead contents over 10 per cent. As might be expected, the raise on charges has created a great deal of dissatisfaction in the community, especially among the miners who have ore for sale, and there are quite a number who have accumulated ore all through the winter, expecting to ship it as soon as the roads were opened, and they supposed that the prevailing terms on which the furnacemen were buying ore would remain unaltered. It is not surprising, then, that a great deal of disappointment is felt by those who were not able to get their ore in before the change was made.

#### Jackson District.

**PROBABLE SALE.**—Silver State, April 27: Negotiations are in progress for the sale of the Pennsylvania mine and mill to an Eastern company. John Catlow is the principal owner of the property, and it is said the parties have agreed upon the price to be paid.

#### Palmetto District.

**REDUCTION WORKS.**—Cor. Walker Lake Bulletin, April 25: The immediate establishment of reduction works at this place by R. B. Catherwood, successor to the old Palmetto Co., is no longer a matter of doubt, certainty having supplanted speculation. The plant consists of a mill of 15 tons capacity. Krome rollers will be used in reducing, and the Breckner furnace in roasting the ore. Lixivation is the process that will be adopted. John L. Powell, manager and superintendent of the mining enterprise, is the architect and builder of the mill. The mill will be set upon the site of the former one of the old Palmetto Co., and the mason work of the latter will be utilized. J. S. Knapp, machinist and engineer, will supervise the placement and running of the machinery. The mines are four miles distant, in a forest of nut pine, and consist of a group of 15 claims, 13 of which are covered by U. S. patents; two, the Brooklyn and Ajax, are recent locations. On the dumps of the President there are nearly 2000 tons that will yield by mill process: gold, 2½ ounces, and silver, 22½ ounces per ton. The greatest depth yet attained is 125 feet, from which levels have been run showing a ledge from two to four feet wide. The vein has been traced 1000 feet; openings have been at ten different points the entire distance, and the same type of high-grade ore is encountered at each place. During the last week ore of better grade has been taken out than heretofore. It is not extravagant to say that the ore now being taken out of this mine, by little as



sorting, will pay from \$200 to \$300 per ton. There are 17 men employed at the mines under the foremanship of Wm. Scott. The mill will be started up early in June. The success of this new enterprise will give a new impetus to Sylvania, six miles distant, a district rich in lead ore, and carrying a large percentage of silver.

#### Star District.

**SHEBA ORE.**—*Silver State*, May 1: William Woolcock, who is working the Sheba mine, is having ore hauled to Mill City for shipment. As the Sheba ore works from \$500 to \$750 per ton, a carload of it is quite valuable.

#### Tuscarora District.

**NORTH COMMONWEALTH.**—*Times-Review*, April 27: Work in the prospect incline advanced to feet. New prospect incline has been sunk 24 feet.

**COMMONWEALTH.**—No. 1 west crosscut has been advanced 23 feet. The formation is clay with some iron pyrites. No. 1 east crosscut from near the face of north drift has been advanced 19 feet. The formation is looking very favorable, and has the same inclination as the ore opened up in the upraise. The north drift from bottom of winze is turning out very fine ore. A drift has been started south from this same winze, and advanced 8 feet, also yielding good ore; average car samples from these two drifts for the week, \$275 per ton. The south intermediate has been advanced 10 feet in high-grade ore; car samples average \$890 per ton; the face is not looking quite so well; the ore will not average over \$500. A large amount of low-grade ore is being extracted from the drifts, which will pay well to concentrate; average assays, \$23.

**NEVADA QUEEN.**—A crosscut has also been started east, from the 219 north drift, and has been driven 8 feet, 250-foot level. The south crosscut has been extended 18 feet. The formation has been somewhat broken, but is becoming regular again. The ore taken from this level averaged \$241 per ton.

**GRAND PRIZE.**—South drift from west vein, 300 level, extended 26 feet; total length, 350 feet. The same promising vein continues as reported last week. Have started a west crosscut from south drift, 300-foot level. It is advanced 24 feet; the face shows seams of quartz that look favorable.

**NORTH BELLE ISLE.**—Connection has been made with the Little Six stopes from the 100-foot level of the Nevada Queen. It shows 65 feet in length of ore ready for stoping. The usual quantity of ore has been sent to the mill and dumps.

**PONDERE.**—South drift advanced 5 feet; ledge continues strong, but of low-grade; are not saving it at present. Progress is slow in this drift, owing to lack of facilities for handling the dirt.

**NAVAJO.**—West crosscut from the end of the south drift, 250-foot level, extended 9 feet. The stopes have yielded their usual amount and grade of ore.

**YOUNG AMERICA SOUTH.**—Upraise, 165-foot level north, up 60 feet. Have suspended work in upraise at present on account of air.

**NAVAJO QUEEN.**—North drift, 200-foot level, advanced 20 feet during the week, in very favorable ground. Rock breaks well.

**FOUND TREASURE.**—Stopes continue to produce the usual output of ore.

**BELLE ISLE.**—Stopes producing as usual.

#### ARIZONA.

**THE SENATOR MINE.**—*Prescott Journal-Miner*, April 25: The arrival of J. W. McGowan is the forerunner of active operations in opening the Senator mine, 11 miles south of Prescott. While East, Mr. McGowan succeeded in interesting capitalists in this great property. We congratulate Mr. McGowan on his success in making arrangements to operate this property, and also his associates for having secured so valuable an acquisition. There has been no mining sale for a long time in this vicinity possessing so complete an endorsement of the people, and of which there is such unanimous approval. We learn that it is contemplated to sink a new double-compartment shaft and drift under the old workings, and complete machinery for hoist and pump has been purchased. It is the opinion of all with whom we have conversed that when re-opened the Senator will prove one of the most valuable and productive mines in Yavapai county.

**HASSAYAMPA.**—*Prescott Courier*, April 25: J. W. McGowan returned from Hassayampa district yesterday. He examined some mines and appears pleased with them. Teams of Shull & Austin are hauling mining machinery, lumber, etc., from Prescott to Antelope, for A. L. Kerr. Water-pipe, concentrators, etc., were taken out yesterday. John Prout, the foreman at Copper Basin, will increase his force of miners. News from the mines causes all our people to rejoice. Chances are that the camp will soon be the largest in this part of the country. Talk is that 80,000 pounds of machinery and supplies are to be hauled out for Mr. Place, superintendent of the Moody & Place, in Bradshaw district. Jackson Killain, of Walker district, brought here yesterday a large lot of placer gold. F. W. Boggs, of the Boggs mine, Big Bug district, is here. Men are taking out ore, large lots of it coming to the sampler. Douglas Gray is putting up a new assay office at the mine.

#### COLORADO.

**NOTES.**—*Silverton Miner*, April 25: The Silver Bell at Red Mountain has resumed operations. The Duckyck sampler starts up on North Star ore on Monday. The Buckeye is preparing to ship as soon as the trail is opened. The Silver Bell at Ophir is doing well in the hands of its new owners. The Climax mine was sold this week to New York parties. The price was \$6000. The interest in mining this season will be divided between Arastra basin and Cement creek. Jack Pendleton has formed a company to work the White Elephant on Lookout mountain. The demand for pack animals this season promises to be far in excess of the visible supply. The Durango smelter will make a determined effort to control the San Juan output this year. The Aspen tunnel will reach the vein in the next two weeks, when the working force will be doubled. The Sheridan and Union mines in Marshall basin will send all their first-class ore by way of Silverton this year. The smelters of the State are bidding lively for the Green mountain mine output. It is heavy

lead ore they are after. Red Mountain is anxiously awaiting the completion of the Silverton railroad to send down about a thousand tons of ore that is now lying upon her dumps. The Emerald lessees report another strike in the lower level, and some fine-looking gray copper was brought to town yesterday. A carload is already on the dump. The ore dumps over at Ophir are crowded and the miners are anxiously waiting for the trail to be opened. The Montezuma, Parsons, and a number of other mines will increase their forces when shipments commence. Work on the Cleveland down the canyon will be started up shortly. The reported strike in the Sunnyside Extension was no myth. Four feet of free gold quartz worth \$500 per ton is about the size of it, and a carload a week will be the output when the trail to Eureka is opened.

#### DAKOTA.

**PARSONS.**—*Deadwood Pioneer*, April 20: Work with a force of three men was resumed a few days ago. Secretary Baggeley visited the property yesterday. From him we learn that already operations demonstrate that the ore vein encountered just before work ceased at the beginning of winter will prove of important dimensions. The ore, both carbonate and galena, is rich, assaying over 20 ounces silver and carrying a heavy percentage in lead. The financial condition of the company is flattering, considerable money and stock being in the treasury at present. A pump will shortly be placed on the property, when sinking will recommence. In the meanwhile, however, the force will be continued at work, drifting on the ore vein.

**TWO-BIT GULCH.**—If two or three good mines are not discovered and developed in Two-Bit gulch during the present season, it will not be for a lack of energy on the part of the prospectors. No district contiguous to Deadwood is at present receiving more attention than this. The prospector, with his pick, powder and fuse, is numerous in the canyon. Locations are being made every day, and a number of them present excellent promise. On one claim, located perhaps 700 to 1000 feet from the Parsons, the owner has met with the strongest and greatest encouragement. Yesterday, in looking for the lead from which certain pieces of float had come, he started a small open surface out. The first stroke of the pick into the soft and yielding ground disclosed a boulder of carbonate ore as large as a man's head. Incited to continue his efforts, another and another blow were as richly rewarded, until within a couple of hours, boulders of ore, aggregating in weight half a ton, were extracted. Considerable excitement was caused and confidence is entertained and expressed that a large ore body will be found before developments have progressed 20 feet further.

#### IDAHO.

**ELK CREEK.**—*Wardner News*, April 26: Work is being pushed vigorously on Elk creek group of mines, and Mr. Wardner engaged an extra force of men on Saturday, who commenced operations yesterday. On the Alma, two shifts are employed in the tunnel which is now in 40 feet and in the shaft which is down about 20 feet two shifts are also engaged. This claim prospects well. On the Alfar, the shaft is down 60 feet, and a similar force is kept at work. A full shaft of ore is displayed that prospects equally well with the Alma. The Nellie Woods has a shaft down 60 feet showing a vein five feet wide of decomposed ore. This is a remarkable showing, being all ore, no strata, averaging in value \$50 per ton. The prospect that Elk creek presents at present is most encouraging. The work of development is going on; 30 men are kept constantly employed and under the superintendence of J. Curry, work progresses rapidly and uninterruptedly.

**HENRIETTA.**—*Idaho Avalanche*, April 28: On Tuesday, we visited the Henrietta mine at Wagon town, where we found Mr. John Kent as foreman, who kindly escorted us around the hoisting works and ore-houses, and showed us a large quantity of rich ore. Some of the ore is very rich, while all will mill well. Though asked, we did not go down the shaft, where we could have seen a load of rich ore. Mr. Kent is opening up the mine in good shape, and will soon have it in condition to keep the mill running.

#### LOWER CALIFORNIA.

**MINING BOOM NOTES.**—*San Diego Union*, April 26: Reports of mineral wealth continue to come in, and the indications are that the Peninsula is almost an unbroken belt of gold and silver. Mr. Hughes, a well-known citizen of San Diego, who was in the mines on the gulf side five or six years ago, tells of the Triunfo mine, about 60 miles northwest of La Paz, the ore of which yielded \$700 to the ton. The San Antonio was almost as rich, but was flooded and is now idle. Mr. Hughes attempted to mine in that district but was compelled to desist on account of the effects of a poisonous weed which killed the mules used in the work. Mr. Miller, assistant superintendent of construction on the Hotel del Coronado, is an old miner from Arizona and caught the gold fever several weeks ago. He could not resist the inclination to get into the field and made a prospecting trip in the San Quintin country. He has just returned, bringing with him glowing reports and remarkably rich specimens. Only four miles from San Quintin three prospects panned 37 cents, 53 cents and 76 cents respectively, and he is satisfied that the entire placer is pay dirt. About 20 miles from San Quintin he secured a fine specimen of pure wire silver, which he says is by far superior to the famous wire silver of Arizona. He also brought up a lump of antimony which was obtained not more than 25 miles from San Quintin. The City of Puebla last evening brought down a party of 15 miners from San Francisco, most of them old fortune-hunters and veterans of the Comstock. They reported great excitement in the mining country above and said that the crowd has already started for the new diggings. They are bound for San Quintin and were in a hurry to secure their tickets on the Pacheco last night.

**ZARAGOZA.**—Prospectors are coming in rapidly, many of them going into the Zaragoza district. Nearly all are old experienced miners and say they never saw better indications, but agree that it is not a poor man's field. There is at least one good stream flowing 50 miners' inches in the Zaragoza

district. Several placers are being worked on its banks and the water can be flumed to a portion of the dry gulches. Careful estimate of the San Rafael river shows a flow of 250 miners' inches on the surface, and there is probably as much water in the bed as in the head of the San Diego river. It can be pumped to hills near the river bank and piped to the Castillo placers, giving hydraulic pressure. The field improves with inspection and appears to be very rich indeed.

#### MONTANA.

**FLINT CREEK DISTRICT.**—*Cor. Butte Miner*, April 21: The district is now feeling the effect of summer weather, and once more the bustle and activity characteristic of a mining camp on the approach of the mining season is exhibited. Prospectors are being outfitted for their summer wanderings. The mines under development are all looking well, but the depth necessary to show up the high-grade rock, for which this camp is noted, takes time. The San Francisco, one of this number, has now acquired a depth of 400 feet, where a station has been cut out and a crosscut begun. The vein is supposed to be some 40 feet from the shaft, and about three weeks' time will be necessary to show what they have got at this working. In the drift from the 200-foot crosscut, however, a body of ore was struck last week that is simply beautiful. Samples from this strike taken from the specimens now at the Kaiser house show it to run from 800 to 1100 ounces. The Combination at Black Pine is still prosecuting development work on the Royal Bounty, and also on the Combination claim, where they are extracting ore and piling it on the dump ready for the starting of the mill, which will probably be on the first of May. On the Royal Bounty claim, the recent discovery has proved even better than anticipated. A new syndicate of Butte men, consisting of Messrs. Pickens, Trask and another Butte party, has taken hold of the Buckeye lode, owned by R. H. Kinney, formerly of Butte, who has developed the claim by means of an incline shaft 60 feet deep and uncovered a 14-foot ledge at that depth, assaying from 22 to 30 ounces in silver and a small percentage in lead. The Teresa lode, located about 9 miles from the Burg, near Stone station, and owned by Dominic Mellen, Rory McKee and Will Albright, has now two shifts on driving the tunnel, which has cut several seams of rich quartz which are supposed to be stringers from the main ore body. The West Granite is not making much noise just at present, but is pushing work on the Butte crosscut, which has now about 200 feet more to run. In Dunkleberg district, Michell & Co. are working the Forest Rose claim, by means of an incline shaft, with great success. At about 230 feet a large pocket of fine ore, which runs above 100 ounces, was encountered. On the Cherry mine a prospecting tunnel has been started by Smith & Kirkendall, to develop that claim and the Tigen. The Hatto lode, now the property of the Hatto Mining Co., lately organized, made a strike of 2½ feet of rich quartz two weeks ago. On Dunkleberg there are now some 25 men employed, with a prospect that when the Hatto gets in full operation that number will be swollen to 40. The Bi-Metallic shipped two carloads of high-grade ore through the sampling-mill at this place, to the Omaha smelter during the week. From the Trout lead Jimmy Patten continues to ship manganese ore through the Phillipsburg sampler to Butte.

**ANACONDA.**—*Review*, April 26: Work in the mining district west of Anaconda has received a fresh impetus the past two weeks. The season being fully a month in advance of that of last year, and prospectors are earlier in the field. A new strike is reported in the Antelope mine in Olsen gulch, which is quite rich. The way the new ore-body was discovered was on account of a cave in the mine while the men were working, which uncovered a fine body of ore which was not suspected. The Silver Chain folks are taking out a small amount of ore, and are now hauling to town for shipment. The Ontario mine is surprising its owners considerably, the character of the ore being very much changed. It is now a rich carbonate, carrying a very high percentage of lead. It will without doubt prove a very valuable property. Cornelius & Brown are shipping iron ore to Butte from their silver-iron lode west of town. Parties in from the Lost creek district report an unusual amount of activity in that district. Work on the George mine at the head of Lost creek is still being prosecuted, and a small amount of ore being taken out. The snow still prevents parties from going out or in much, as everything has to be packed in nearly two miles. The Blue-eyed Nellie mine is looking exceptionally well, the owners are now taking ore out of the new drift and it is richer than ever before. The company still continues to ship to the Omaha and Grant smelter. At the Cable the sinking of the three-compartment shaft has reached a point 200 feet below the tunnel level. Johnny Cosgrove and partners are pushing work on the Little Nellie claim. The shaft is now down 95 feet.

**ACTIVITY.**—*Phillipsburg Mail*, April 28: A marked increase of activity in mining circles is the feature of the week. The possibility of working profitably the small prospects in the gulches having been demonstrated by H. L. Hoyer in the Blackmail and Scratchall, applications for leases are numerous and new locations are also being prospected for. A strike on the Gladstone is reported in the shaft. The ledge is five feet in width, almost all of which is ore giving an average assay of \$50 per ton. An assay of a choice piece gave \$1600. The Gladstone lies on the left hand side of Camp Creek gulch just west of the Northwest mill, the vein striking northeasterly and southwesterly.

**SAN FRANCISCO.**—In the east drift of the 200-foot level the streak has widened to five feet of big-grade ore of a quality equaling any that has been uncovered since work began. It carries native and ruby silver in abundance, and is of an even grade of richness over the entire five feet. At the 400-foot level the vein was tapped last Thursday at a distance of 16 feet from the shaft (printed 716 feet by mistake in our last issue), and drifting to the west is now under way. A streak of ore about 26 inches wide has been encountered in this drift, and the rock is of even better quality than that just discovered in the upper level. The condition of affairs at the San Francisco are now such as to make it a matter of little doubt that a mine of great and permanent value is developed. Already in both the 100 and 200-foot levels there are large bodies of ore ready

for stoping, and without further development sufficient ore could be extracted to considerably more than pay for the work already done.

#### NEW MEXICO.

**TAILINGS.**—*Silver City Enterprise*, April 27: At odd times the Bremen mill is working on 3000 tons of tailings purchased from the Flagler works. The Peerless was bought in for \$500 by A. F. Shapleigh, who held the \$5000 mortgage under which the sale occurred. The Standard mill and mine at Gold Hill will resume operations in a few days. The mill will treat custom ore for the camp. Sixteen tons of ore from Bald mountain is being milled at the Bremen by Willis James and James Woodward, lessees of the mine. It runs well. Wm. Gessner has leased from T. N. Childers the Bear Chief, Horn Silver, the "87" and ¾ interest in the "49," Bear mountain district. He has also taken a \$5000 bond on the property. Mrs. Jennie Corbett has taken a working bond of Alva Mason and M. H. Casson for one year, for \$5000, on Casson and Fraction mines at Pinos Altos.

#### OREGON.

**RICH ASSAYS.**—*Bedrock Democrat*, April 23: The returns from the ore assays from the Chloride mine made by assayer John H. Bacon of this city yesterday, gave the following result: No. 1, 72.18 ounces silver to the ton; No. 2, 192.90 ounces. These returns are very flattering, indeed, to the energetic owners of the Chloride, and show conclusively that the ore becomes richer as development work proceeds, and giving every indication of a mine of which the half has not been told. Mr. Bentley, the superintendent of the Chloride, went to La Grande yesterday to confer with and make a report to the directors and officers of the company.

**FAVORABLY IMPRESSED.**—Several prominent mining men from abroad have recently arrived here and visited the mines of Cracker creek district, and express themselves greatly impressed with what they saw, and will return again in a few weeks to make a more thorough examination. Snow still lies on the ground in that section and somewhat retards locomotion, but within the next week or so, if the warm weather continues, it will rapidly disappear. Then the trails and roads will be open and the mines easy of access, affording one and all an opportunity to visit the mining centers of Baker county.

**PROSPECTING.**—*Jacksonville Times*, April 27: Much prospecting is going on. Most of the miners are cleaning up. Considerable gold dust is now being brought to town. Prickett, Finney & Shearer, and John O'Brien of Steamboat district, are panning steadily and making good progress. Chas. Bailey of Foot's creek was in town and showed us some very rich quartz taken from a ledge he is interested in with Alex. Orme. One small piece was nearly solid with gold and worth \$30. John O'Brien of Applegate a short time since exhibited a 50-dollar slug of gold, taken from the placer mines he is interested in with Thos. Berryman. J. S. March this week showed us some fine specimens of quartz taken from the ledge he recently discovered in Table Rock precinct. They are full of free gold.

#### UTAH.

**SILVER REEF.**—*Cor. Salt Lake Tribune*, April 24: Silver Reef is not dead "but sleepeth." There might be much done here that is not, and if life enough remained to conjecture as to the cause of the condition of things here, much of it would be attributed to the unnecessary idleness of the Stormont Mining Co. This camp can be easily and profitably awakened, and for the benefit of its inhabitants, who are a good average class of people and who have built and improved homes here, I would like to see the company go to work. I am reliably informed that thousands and thousands of tons of 11 to 20-ounce ore is in sight in the Stormont Co.'s property. This property embraces the Stormont, Buckeye, Last Chance, Thompson and McNailey mines and the river mill. A few yards below the Stormont mine (which is the lowest situated of any) is a natural mill-site, down to which ore from all the group could be easily tramwayed, or otherwise conveyed. The ore here is sand-rock, and 5 stamps easily crush 40 tons per 24 hours. The Stormont has a continuous belt of ore that will mine-sample 14 ounces; no ore was shipped to the mill that did not mine-sample 15 ounces. Seldom was anything shipped from the Thompson and McNailey that did not go to 25 ounces, and there are hundreds of tons in stulls and cribs that with little sorting will sample 20 ounces. The Last Chance has an accessible dump of 2000 tons or more that was made when only rich ore was shipped, and it never has been touched since. The rock is easily manipulated, and there is plenty of it. Labor is cheap. Wood is \$8. Stone coal is \$12 per ton. Water is abundant; in fact, many claim that there is enough obtainable to run the machinery of a mill. Ore can be mined and milled here cheaper than in any camp in this country.

**PARK NOTES.**—*Record*, April 28: The Deer Valley Co.'s property is to be further developed by driving the tunnel another 150 feet. The tunnel is now in 500 feet. The Crescent tramway is free from snow, but owing to repairs to the engine being made, it will not start up for about ten days yet. A new boarding-house is to be built at the Daly mine. It will be located north of the hoisting works where there will be much less danger of destruction by snow slides. Sinking in the Crescent's incline shaft was resumed a short time ago, but after going down 12 feet the work had to be stopped because of the water. Pumps will be put in soon, and then this trouble will be an easy matter to control. A gentleman named Smith, of Helena, Montana, who represents the syndicate which bonded the Dolberg group, a couple of months ago, is expected to arrive here in a day or two to open the way for the commencement of active operations on this valuable property.

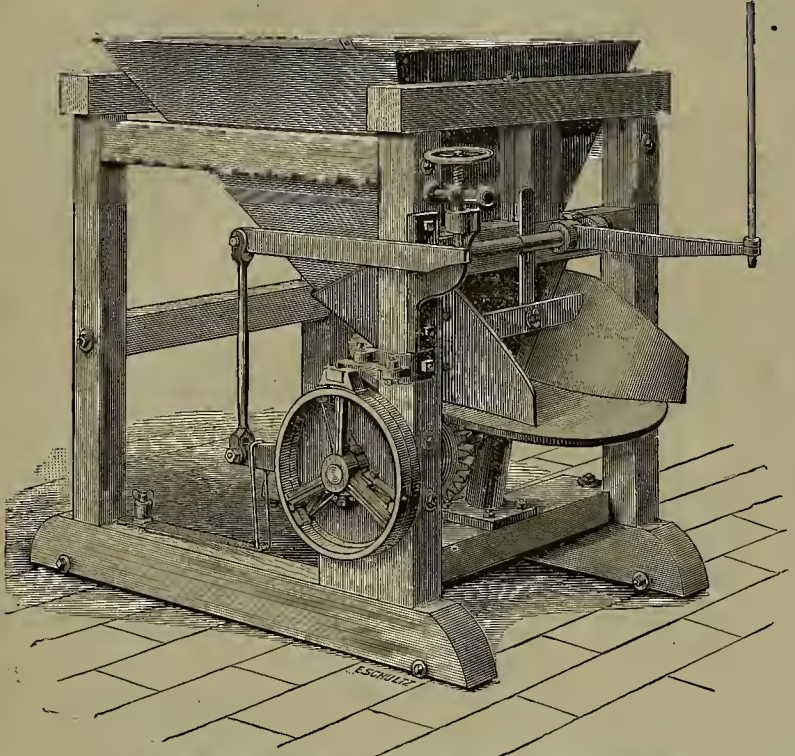
**ORE AND BULLION SHIPMENTS.**—During the week the Crescent shipped 108,000 pounds of first-class ore. For the week just ended the Mackintosh sampler received 368,520 pounds of Ontario ore and 373,240 of Daly ore; total, 741,760 pounds. The first of the week the Ontario shipped 33 bars of bullion containing 18,724.25 fine ounces of silver. On Tuesday 6 bars of Daly bullion, 6931 fine silver ounces, were shipped from the Marsac mill.



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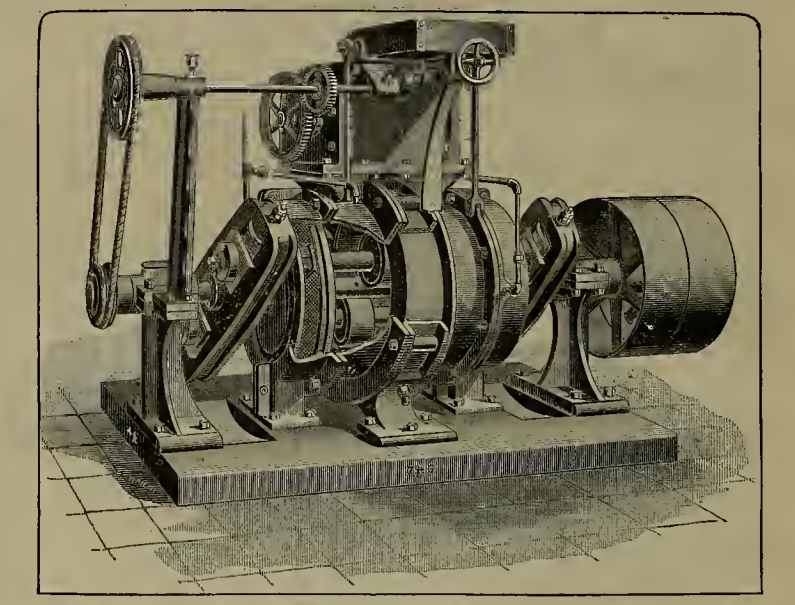
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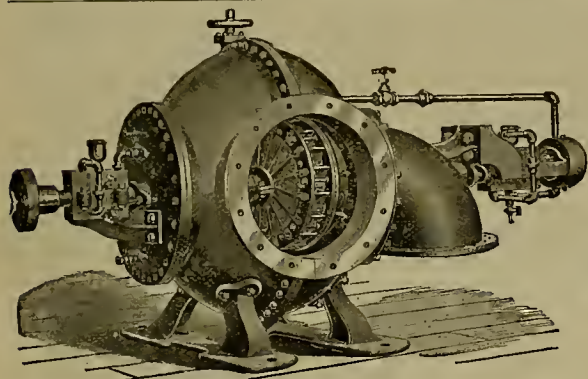
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## Petroleum Fuel.

As several times mentioned in the PRESS, there has been a contest going on between the oil men and the insurance fraternity on the subject of the proper use of petroleum as fuel. For several months the supervisors have had the matter before them, and both sides of the controversy have been heard before the Fire Department Committee. The main point has been that the oil men wanted a fire test of 80 degrees, while the insurance men insisted on a test of 90 degrees. Meantime permits have been granted in several cases. The Fire Commissioners petitioned the Board to regulate the use of petroleum, and especially to amend the resolutions being considered by increasing the test to 90 degrees, and permitting fire wardens and their employees to inspect the fuel at its place of storage.

This week the matter was finally settled in the board when the resolution granting the Glass Works, Candle Company and Wire Works permission to store for use as fuel over two weeks ago, came up on final passage.

Supervisor Boyd then introduced amendments as follows:

First—Striking out the 80 degrees, and inserting 90 degrees.

Second—Inserting "And in case of a refusal on the part of said \* \* \* or their officers or employees to allow any member or members of the Board of Fire Wardens to visit and inspect said premises and the petroleum oil being used at any time while the said works are in operation, then this privilege shall cease and determine and become null and void."

Supervisor McDonald said he was just as much disposed to protect life and property as anybody. But an increase to 90 degrees would make the use of petroleum impossible. In explaining his vote later, on the passage of the resolutions as amended, to print, McDonald said: "This increase to 90 degrees will so increase the cost of the oil as to render its use as fuel impossible. I have no special interests to subserve. I only want to balance the manufacturing and other interests of the city. The glass, works, for instance, will not be able to compete with Eastern manufacturers unless permitted to use crude petroleum of 80 degrees test. The works are isolated, and no steam or engine is used in them." McDonald voted against the proposed amendments.

Mr. Knorr also voted "no," and in explaining his vote said: "We have had this matter under consideration for eight or nine months. We have heard the testimony of experts, and have learned that the distillation necessary to increase the test to 90 degrees would make the fuel cost more than coal, even at present rates. The Julia matter ought not to be brought in at all. The petitioners have not asked leave to inject petroleum under boilers at an intense heat. We shall simply prohibit petroleum fuel if we fix the test at 90 degrees; and to give the fire wardens or any employees of the fire department the power to bring to an instant standstill the operations of a large manufactory would be to place too much power in their hands."

The amendments were adopted by a vote of eight to two, so that the 90-degree fire test will now be the rule, and the insurance and coal men win their contest with the manufacturers and oil producers.

The result may be regarded as a setback to the manufacturing interests of this city. Coal is always high in price, and just now it is abnormally so. The oil fuel is economical and handy, and were it not for the restrictions more manufacturers would use it than now do so. Moreover it is a natural product of the State which should be utilized as far as possible. The expense of preparing the fuel to stand the 90-degree test increases the cost materially. In this connection it may be stated that since oil has been used by one of the establishments mentioned above, there have been two fires caused by spontaneous combustion in the coal piles in its yards. The manufacturers insist that there is no danger in the use of the oil and are willing to agree to reasonable restrictions, but they object to those that have been adopted.

ATTORNEY-GENERAL JOHNSON, in an opinion relative to which one of the two Boards of Fish Commissioners was entitled to hold office, has decided in favor of the old board, Joseph Rousier and J. Downey Harvey; also, Charles Josselyn, who was appointed by Gov. Waterman, vice Sherwood, resigned.

## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING APRIL 24, 1888.

381,521.—SIPHON—G. W. Arper, Oakland, Cal.  
381,671.—PROTECTING PILES—Geo. Brown, S. F.  
381,673.—COUNTER SCALE—J. B. Butenschon, Portland, Ogn.  
381,676.—SWITCH AND FROG FOR RAILWAYS—Cromer & Gavin, Eureka, Nev.  
381,624.—TROUSERS—J. Hetherington, Jr., Haywards, Cal.  
381,695.—RUNNING GEAR—E. Hickman, Red Bluff, Cal.  
381,549.—HEATER FOR MUFFS, ETC.—F. Hiller, Jr., S. F.  
381,629.—ORE-ROASTING FURNACE—J. L. Lovell, Austin, Nev.  
381,638.—BOTTLE-WASHING MACHINE—Henry Palmer, S. F.  
381,723.—COMBINED HEADER AND THRASHER—Reynolds, Paterson & Paterson, Stockton, Cal.  
381,727.—TRUSS—H. C. Stickney, Portland, Ogn.  
381,861.—STUMP EXTRACTOR—G. M. Stroup, Philomath, Ogn.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BOTTLE-WASHING MACHINE.—Henry Palmer, S. F. No. 381,638. Dated April 24, 1888. This invention relates to that class of bottle-washing machines in which the bottles are supported and carried in a drum or frame mounted and adapted to rotate in a vessel containing water. The invention consists in an improved drum or frame whereby the bottles are supported in a horizontal position parallel with the axis of the frame, and by which their exterior surfaces are scraped clean. The object is to form a rapidly operating automatic machine for washing bottles.

ORE-ROASTING FURNACE.—James L. Lovell, Austin, Nev. No. 381,629. Dated April 24, 1888. This consists of a cylindrical, horizontal or vertical rotary furnace body, and in combination therewith of two or more fireplaces, with hanging walls in the receiving chamber. By the peculiar construction adopted, the inventor has been enabled to raise the amount roasted by the furnace from 65 per cent, which was done before these improvements were added, to 97 per cent, that the furnaces have done since Mr. Lovell's improvements were added.

PROTECTING PILES.—George Brown, S. F. No. 381,671. Dated April 24, 1888. This invention relates to an improved means for protecting piles from the ravages of marine, worms and insects. It consists of an exterior casing made of strips of wood or material which will resist the attacks of worms or insects. This casing is jointed so as to make it watertight, and is supported at a short distance away from the body of the pile by blocks fixed around the pile at intervals, and the ends are finished out by solid beveled blocks which close them completely. The space within this exterior casing is filled with an adhesive or binding compound. In connection with this is employed an extension or fender upon such piles as are exposed to contact from vessels or exterior abrading substances.

TROUSERS OR OVERALLS.—John Hetherington, Haywards. No. 381,624. Dated April 24, 1888. This invention relates to that class of garments which may be distinguished by the qualifying term "pantaloons," and includes what are ordinarily known as pants or trousers, overalls, etc., and this invention consists in an improved pantaloons garment. The pocket is made in a peculiar manner, which affords economy in time and lends strength to it by not having the seam at the bottom, so that any rip takes place in the side where it is not usual for a rip to occur, and the formation of a double pocket affords convenience to the wearer.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Cons. California and Virginia, April 23, \$88,276; Savage, 23, \$32,000; Hale and Norcross, 28, \$103,000; Confidence, May 1, \$13,681; total so far for April, \$164,970; Standard, 1, \$4624; Germania, April 26, \$3721; Hanauer, 26, \$1620; Queen of the Hills, 27, \$1300; Hanauer, 27, \$1600; Germania, 28, \$1800; Bluebird, 28, \$32,736; Lexington, 28, \$24,024; Moulton, 28, \$14,992; Germania, 29, \$1661; Hanauer, 29, \$3150; Queen of the Hills, 29, \$1250; Crescent, 29, \$2150; Germania, 30, \$3605. The shipments cut from Salt Lake City for the week ending Saturday, April 28th, were 18 cars of bullion, 439,602 lbs.; 64 cars of silver and lead ore, 1,642,680 lbs.; 4 cars copper ore, 106,700 lbs.; 1 car copper matte, 26,600 lbs.; total, 87 cars, 2,215,672 lbs.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

## ASSESSMENTS.

COMPANY.	LOCATION.	No.	AM'T.	LEVIED.	DELINQ'T.	SALE.	SECRETARY.	PLACE OF BUSINESS.
Belcher S M Co.	Nebraska.	34.	50.	Mar 13.	Apr 17.	May 7.	J. Crockett.	327 Pine St
Butte Creek Hyd M Co.	California.	12.	25.	Mar 27.	May 1.	May 26.	L. R. Levy.	213 Market St
Baltimore S M Co.	Nebraska.	1.	25.	Apr 10.	May 1.	June 8.	W. L. Brown.	402 Montgomery St
Crispin M Co.	Arizona.	1.	10.	Mar 7.	Apr 15.	May 5.	P. H. Leonard.	628 Montgomery St
Crown Point M Co.	Nebraska.	49.	50.	Apr 13.	May 16.	June 6.	J. Newlands.	329 Pine St
California Slate Co.	California.	1.	10.	Apr 18.	May 24.	June 25.	J. H. Hanson.	10 California St
Day M Co.	Nebraska.	15.	100.	Feb 3.	Apr 9.	May 7.	R. R. Grayson.	327 Pine St
Equitable Tunnel Co.	Utah.	33.	15.	Feb 14.	Mar 30.	May 9.	C. J. Collins.	1018 Market St
Excelsior & M Co.	California.	11.	3.30.	Mar 20.	Apr 31.	May 9.	W. J. Stewart.	215 Sansome St
Gould & Curry M Co.	Nebraska.	58.	50.	Mar 12.	Apr 17.	May 10.	A. K. Durbrow.	309 Montgomery St
Golden Prize M Co.	Nebraska.	1.	25.	Apr 21.	May 26.	June 16.	C. D. Bennett.	328 Montgomery St
Mayflower Gravel M Co.	California.	15.	25.	Apr 9.	May 14.	June 1.	R. R. Grayson.	328 Montgomery St
Navajo M Co.	Nebraska.	19.	30.	Apr 12.	May 17.	June 7.	J. W. Fawcett.	310 Pine St
Phil Sheridan Con M Co.	Nebraska.	3.	10.	Mar 7.	Apr 14.	May 5.	T. F. Holling.	533 Kearny St
Peerless M Co.	Arizona.	1.	25.	Apr 4.	May 7.	May 28.	A. Waterman.	309 Montgomery St
Paradise Valley M Co.	Nebraska.	51.	15.	Apr 21.	May 25.	June 18.	A. Chemin.	328 Montgomery St
South End M Co.	Nebraska.	1.	10.	Apr 4.	May 7.	May 23.	R. N. Van Brunt.	309 Montgomery St
Sierra Nevada S M Co.	Nebraska.	31.	25.	Apr 3.	May 8.	May 28.	E. L. Parker.	309 Montgomery St
Trojan M Co.	Nebraska.	17.	10.	Mar 27.	May 4.	May 28.	J. F. Holling.	533 Kearny St

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE
Commonwealth Con M Co.	Nebraska.	H. Deas.	339 Montgomery St.	Annual.	May 9
Church G M Co.	California.	J. M. Bingham.	303 California St.	Annual.	May 7
Chicago M Co.	California.	J. Capps.	520 Montgomery St.	Special.	May 8
Diana M Co.	California.	J. W. Pew.	310 Pine St.	Annual.	May 8
Edna M Co.	California.	R. E. Kelley.	414 California St.	Annual.	May 8
Live Oak Drift M Co.	California.	J. Morizo.	325 Montgomery St.	Annual.	May 7
Morgan M Co.	California.	C. S. Neal.	233 Montgomery St.	Annual.	May 5
North Star M Co.	California.	D. A. Jennings.	410 California St.	Annual.	May 9
P & P Con M Co.	California.	J. W. Pew.	310 Pine St.	Annual.	May 12
Scorpion M & M Co.	Nebraska.	G. S. Spiny.	310 Pine St.	Annual.	May 14

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nebraska.	H. R. P. Hutton.	309 Montgomery St.	50.	Apr 10
Eureka Con M Co.	Nebraska.	J. W. Pew.	310 Pine St.	50.	May 7
North Belle Isle M Co.	Nebraska.	J. W. Pew.	310 Pine St.	50.	May 7
Oregon Coal & Navigation Co.	Oregon.	R. E. Williams.	211 Sansome St.	1.50.	Mar 2
Pacific Harax, Salt & Soda Co.	California.	A. H. Clough.	230 Montgomery St.	1.00.	Apr 10
Russell Education & M Co.	California.	J. Morizo.	325 Montgomery St.	1.00.	Sept 17
San Francisco Copper M Co.	California.	F. E. Berler.	320 Sansome St.	41.	Sept 19
Standard Con M Co.	California.	J. W. Pew.	310 Pine St.	50.	May 12

## Mining Share Market.

The stock market has been comparatively active for the past few days. The feature of the week has been the declaring of a dividend on Hale and Norcross of 50 cents per share. This is the first dividend declared on this mine since the 10th of April, 1871, which was of \$5 per share on the 8000 shares then in the mine. Up to the present time there has been \$1,598,000 disbursed in dividends, and \$5,086,000 collected in assessments, the last of which was on July 7, 1887. The company has on hand in excess of mine expenses, which are nearly all paid up, a surplus of \$107,097.77, of which \$88,097.72 is in gold coin at the bank, and the balance, \$19,000, in refined silver bars at the Carson mint, with further shipments to arrive ere the close of the fiscal month. The dividend is payable on Tuesday, May 8th.

The Virginia Enterprise says that work on the Sutro tunnel drift to connect with the 1300 level joint Crown Point and Belcher drift will not commence before May 1st. Ingersoll drills and other implements to rush drift work are being taken out of the joint drift and transferred to the Sutro tunnel side, where preparations are making to work them effectively. The Sutro tunnel has 900 feet to run to make the connection. When this is made the south end mines can be much more advantageously worked at that depth. They are much retarded now for air on the deeper levels which they are working. The upraise on the 1300 level of the Belcher is intended to develop a large section of absolutely virgin ground. Not a pick has ever been struck in this ground below the 300 level of the Belcher on the south end. The upraise is now reported to be looking well. Should a promising ore body be struck at that point it will have its full speculative value unhampered by former prospects and old timbers.

## New York Metal Market.

Telegraphic advices dated May 3d give the following New York prices: BAR SILVER—91 3/4 per oz. BORAX—@40. COPPER-LAKE—\$16@16.60. IRON—No. 1, \$22.00. LEAD—\$4.50@4.75. TIN—\$27.00@28.00.

The following is the latest by mail from the "New York Metal Exchange Market Report": COPPER—Dull, spot closing at \$16.05@16.20. Transferable Notices (Lake) issued at \$16.20@—. LEAD—Dull, at \$4.25@4.75 spot. Transferable Notices issued at \$4.75. TIN—Inactive, at \$34.00@34.50. Transferable notices issued at \$32.00@33.00.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, \$36.00@36.25; Billiton Tin, \$37.50@—; Banca Tin, \$38.00@—; Baltimore Copper, \$15.40@16.00; Orford Copper, \$15.50@16.00; P. S. C. Copper, @—; Foreign Lead, \$5.10@5.15; Foreign Spelter, \$6.00@6.12. Antimony, \$19.75@14.00.

## San Francisco Metal Market.

WHOLESALE.	THURSDAY, May 3, 1888.
ANTIMONY—French Star.	9 @ 9 1/2
BORAX—Refined.	@ 7
Powdered.	7 @
Concentrated.	61 @
COPPER.	
Boiler.	26 @ 30
Sheeting.	26 @
Ingot.	@ 26
Fire Box Sheets.	@ 26
IRON—Cleveland.	@ 20
England, ton.	@ 28
American Soft, No. 1, ton.	@ 33
Oregon Pig.	21 @ 23
Clay Lane White.	@ 31
Shells, No. 1.	5 @ 5 1/2
LEAD—Pig.	5 @ 5 1/2
Bar.	5 25 @ 5 50
Sheet.	@ 5 1/2
Shot, discolored 10% on 80 lbs.	Prop. 8 @
Buck, 8 lbs.	2 @ 0 @
Chilled, do.	2 @ 0 @
STEEL—English.	16 @ 20
Black Diamond tool.	10 @ 16
Pick and Hammer.	8 @ 10
Machinery.	6 @ 8
Tool Calk.	4 1/2 @ 6 50
TINPLATE—Coke.	6 75 @ 6 50
Charcoal.	6 75 @ 6 25
QUICKSILVER—By the flask.	33 50 @ 40
Flasks, new.	1 05 @
Flasks, old.	85 @

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING Apr. 12.	WEEK ENDING Apr. 19.	WEEK ENDING Apr. 26.	WEEK ENDING May 3.
Alpha.	2.75	3.00	2.50	2.75
Alta.	2.15	2.45	2.05	2.00
And.	1.60	1.60	1.50	1.50
Argenta.	.20	.25	.25	.25
Belcher.	7.00	7.50	6.00	7.25
Brophy.	.50	.50	.50	.50
Best & Belcher.	.50	.50	.50	.50
Buller.	1.75	2.10	1.90	1.65
Baltimore.	1.60	1.05	.65	.90
Belle Isle.	.70	.80	.65	.65
Bodie Con.	2.35	2.80	2.50	2.75
Boston.	2.35	2.50	3.00	2.50
Bodie Tunnel.	.90	.95	.75	.80
Bulwer.	.90	.95	.75	.80
Con. Va. & Cal.	1.45	1.12	1.14	1.23
Challenge.	9.50	10.75	8.50	9.75
Champion.	6.50	4.90	6.00	5.25
Chollar.	3.30	3.60	3.20	3.50
Confidence.	6.00	6.75	6.00	6.00
Con. Imperial.	.70	.75	.55	.60
Caledonia.	.70	.75	.55	.60
Chollar.	6.50	4.90	6.00	5.25
Crown Point.	.60	7.00	4.90	5.25
Crocker.	.90	1.00	.85	1.00
Central.	.90	1.00	.85	1.00
Dudley.	.90	1.00	.85	1.00
East & B.	.90	1.00	.85	1.00
Eureka Con.	.11	.11	.11	.11
Exchequer.	1.30	2.00	1.45	1.75
Grand Prize.	2.65	2.75	2.30	2.65
Gould & Curry.	4.05	4.50	4.30	4.50
Hale & Norcross.	.90	1.01	.85	.95
Holmes.	.90	1.01	.85	.95
Independence.	.50	.50	.50	.50
Iowa.	1.30	1.45	1.25	1.35
Julia.	.55	.60	.50	.55
Just.	1.40	1.55	1.40	1.55
Kentuck.	3.50	4.00	2.75	3.00
Lady Wash.	.65	.45	.60	.55
Martin White.	.70	.75	.65	.70
Mono.	4.90	5.50	5.25	4.75
Nager.	4.00	4.00	4.00	4.00
M. Diablo.	4.00	4.00	4.00	4.00
Northern Belle.	1.80	1.95	1.45	1.70
Navajo.	.61	.65	.65	.65
North Belle Isle.	.61	.65	.65	.65
Nev. Queen.	4.05	4.30	4.00	4.25
North G. & O.	.70	.75	.65	.70
Occidental.	.70	.75	.65	.70
Orford.	.70	.75	.65	.70
Overman.	2.85	3.10	2.75	3.00
Potosi.	4.45	5.25	4.00	4.70
Peerless.	1.30	1.50	1.35	1.50
Peer.	.55	.65	.60	.65
Silver Hill.	.75	.80	.70	.75
Silver Star.	.75	.80	.70	.75
Savage.	.75	.80	.70	.75
S. B. & M.	5.00	5.75	4.45	5.00
Sierra Nevada.	4.50	5.00	3.80	4.70
Silver King.	.75	.80	.70	.75
Scorpion.	.80	.85	.75	.80
Syndicate.	4.40	4.65	4.25	4.50
Union Con.	1.85	2.20	1.60	2.00
Utah.	1.85	2.20	1.60	2.00
Yellow Jacket.	8.50	9.50	8.00	9.00

## Sales at San Francisco Stock Exchange.

WEDNESDAY May 3.		20 Justice.		1.20	
50 Alpha.	2.50	40 Julia.	1.55		
200 Alta.	2.00	50 Mexican.	5.00		
200 Baltimore.	.90	160 N. Belle Is.	.51		
450 Belcher.	.74	100 Nev. Queen.	4.80		
700 B. & B.	.50	100 Ophir.	.91		
200 Bullion.	1.75	200 Overman.	2.55		
170 Bodie.	2.70	400 Peerless.	2.20		
100 Challenge.	.80	300 Peer.	.85		
330 Chollar.	1.20	150 Potosi.	4.50		
1270 Con Va & Cal.	1.15	150 Savage.	.50		
100 Crocker.	1.40	150 Scorpion.	.80		
1850 Crown Point.	.74	500 S. B. & M.	4.80		
200 Con. Imperial.	.60	100 Sierra Nevada.	4.40		
200 Exchequer.	.60	100 Silver Hill.	.70		
200 Gould & Curry.	4.70	400 Union Con.	4.15		
135 Hale & Nor.	.90	100 Utah.	1		
50 Iowa.	1.20	110 Yellow Jacket.	.7		



## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

**JUPITER GRAVEL, MINING AND WATER CO.**—April 30. Object, to do a mining business and also to furnish water for all purposes to the towns of Murphys Camp, Douglas Flat, Vallecito, Carson Hill, Angels Camp and Altaville, in Calaveras county, and to Jack Rabbit, Monarch and Jupiter mines in the same county. Capital stock, \$10,000,000. Directors—W. A. Keefe, J. D. Whitney, John A. Hammersmith, Frank J. Allison, Eugene N. Deuprey, W. S. Wood and E. A. Grow.

**SAN FRANCISCO NATURAL GAS AND OIL CO.**—April 30. Object, to bore for gas and oil. Capital stock, \$1,000,000. Directors—John W. Stewart, J. W. Brown, A. H. Hogg, C. G. Nagle and A. E. Bald.

**MUTUAL ENTERPRISE CO.**—April 30. Object, to do a general mining, milling and ore-reduction business. Capital stock, \$15,000. Directors—O. H. Bogart, J. M. Bryan, D. E. Barger, B. C. Brown and W. A. Searles.

**NORTHERN CALIFORNIA LAND AND LUMBER CO.**—April 30. Object, operating sawmills, mines, colonizing lands, etc. Capital stock, \$1,000,000. Directors—Geo. McCarthy, Geo. H. Forster, Frank Dalton, Geo. McCord, David Bush, Geo. M. Mitchell and T. L. Potter.

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3.00 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

HUGH O'HARA has struck a 25-barrel oil well in Santa Paula canyon, not far from the town of the same name.

J. A. JOHNSON, 307 Montgomery street (the Nevada Bank building) is the general agent of the Stiles quartz machinery, and offers easy terms for introduction.

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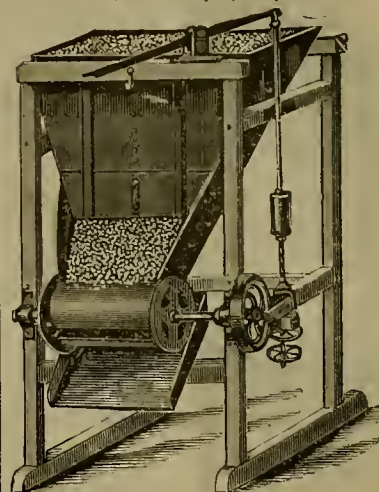
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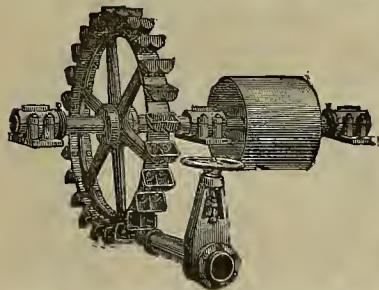
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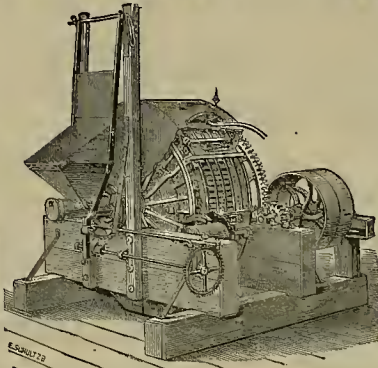
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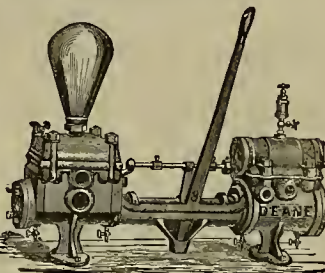
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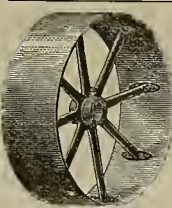
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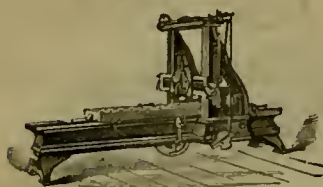
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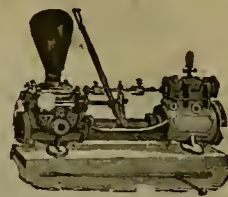


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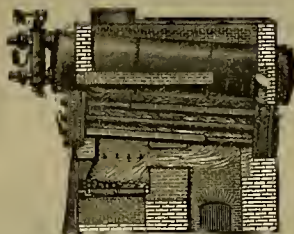
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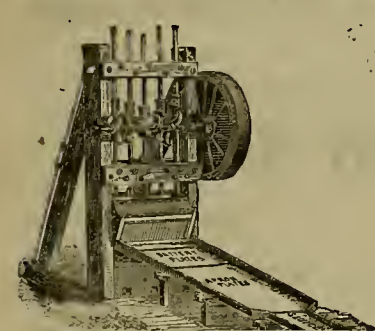
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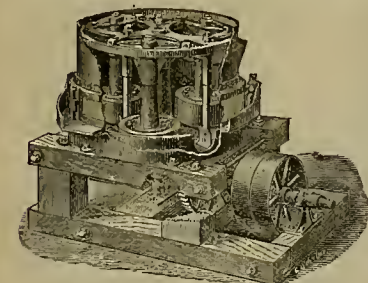
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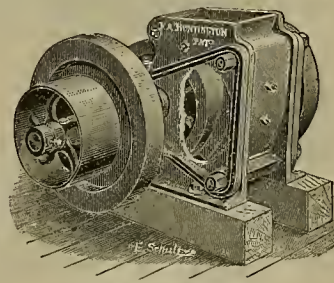
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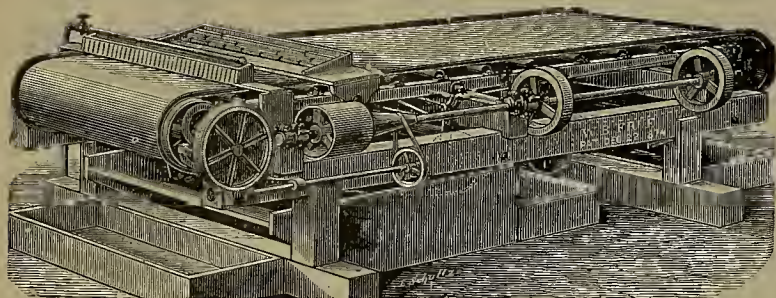
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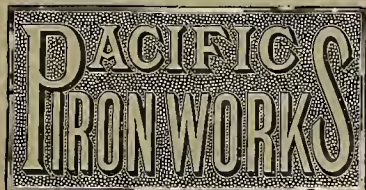
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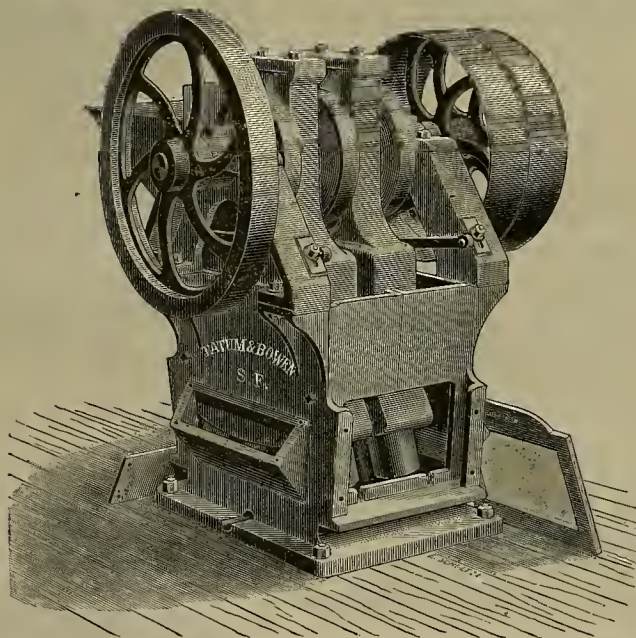
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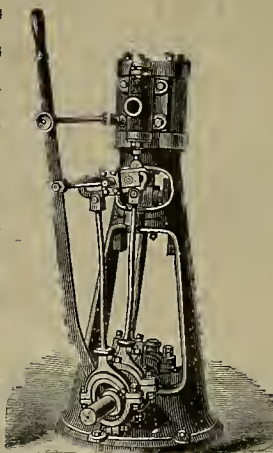
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*An Illustrated Journal of Mining, Popular Science and General News.*

VOLUME LV.  
Number 19

At the annual meeting of the Pacific Iron and Nail Co. the old Board of Directors were re-elected, as follows: H. J. Sadler, W. F. Mau, P. A. Wagner, H. E. Bothin, R. Sadler, Albert Dallemand and William Wright. The new board elected the following officers for the ensuing year: H. J. Sadler, President; P. A. Wagner, Vice-President; W. F. Mau, Secretary; William Wright, General Agent.



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—EDS

## Glendale, Montana.

## Old and New Prospects.

EDITORS PRESS:—Three furnaces are running at the Hecla smelter here at present. One has been shut down a few days for repairs, but is now in operation again.

We understand that this company's mines produced more bullion during '87 than any previous year. Much of the money has been expended for improvements, principally in timbering and developing the mines. So much for good management.

Mr. Kemper (millwright) has a crew of men repairing the company's concentrator at Greenwood, which is to be started up in a few days. The tramway between there and the mines is now running.

We understand the works are to be operated more steadily and extensively this season than ever before; hence the outlook for Trapper gulch is very favorable.

J. O'Green has disposed of an interest in his mines on Cherry creek, about five miles south-east of Lion hill, to some Butte parties. We hope to learn of valuable developments before the summer is over. That locality has been very little prospected yet. We are looking hopefully toward the development of

## Vipond District.

Located about ten miles from here, north-west-erly, and about six miles northerly from the famous Hecla mines in Lion hill.

This is apparently one of the most promising undeveloped districts in Western Montana, but like many more prospects, in the wrong hands. The Mowonotoc and Gray Jockey mines owned by Brown and Vipond brothers are apparently the best prospects in the district and have been developed sufficient to show vast bodies of ore.

The Gray Jockey is from 15 to 37 feet in width. The ore is mostly milling, and a great portion of it runs from 40 to 60 ounces of silver per ton; some runs over 100 ounces.

The Mowonotoc is not so extensive, being from four to six feet in width except at one place where the ore body is 20 feet wide; but the ore is very rich, running from 150 to 500 ounces in silver, and carrying considerable lead. About \$25,000 worth of ore was shipped from these two mines years ago, when it was freighted to the U. P. R. R. by mule teams; but now the property is idle.

The discoverers, Vipond brothers, rambling, restless prospectors, whose home is in Africa, Australia, Mexico or anywhere else that a mining excitement is raised, seem to have left the management of the property to their co-owner J. A. Brown, one of Montana's cattle kings, who, like the majority of ranchers, nature seemed never to have adapted to the development of mines.

Less than a mile westerly from the property last referred to is the Faithful, owned by Armstrong & Losse and Fansher. From its several carloads of ore have been shipped with good returns. The ledge is from 10 to 25 feet in width, mostly milling ore, but carrying some lead. With the right kind of reduction works on or near this mine it might be considered a bonanza; but the principal owners are too deeply interested on Puget Sound and other distant places to do more than represent this property.

In the same group we should mention two more prospects—the Cordwood and Rich-hill, owned by Joseph Storm—both of which look well so far as developed, and from which the owner has sold considerable ore.

It is too bad that a district so favorably located for timber, water, and roads, should have lain idle so long, yet it seems the fate of many of the best mining localities to exist under a ban for a certain length of time before they get their boom. However, we understand Mr. Brown is awaiting the return of his co-owners—who are now in Lower California—when "something will be done."

Across Sheep mountain, about two miles (air line) westerly from the mines above mentioned, is another group very little developed. The most promising of these is the Bluehill, owned by Thomas and Shepherd, from which several carloads of argentiferous galena have been shipped to Omaha with good returns; but water forced the owners to suspend work, until some means of pumping or draining have been applied.

Higher up the mountain-side southeast is the Lily, owned by George Chin, who aims to work it during the coming summer. Former owners shipped a quantity of high grade ore to Omaha, which inspires George with hopes.

Near the summit of the mountain on the east side is the Grand View, owned by Terry Bros., who have labored faithfully, but with some mishaps by caving in of shafts.

In addition to the above many smaller prospects have been discovered, and we expect before the summer has passed some fine bonanzas will be developed in this district. B.

Glendale, Montana.

## Cryolite Mining.

I talked with two old-time sea captains the other day. One of these hardy navigators was a tall, full-faced, well-built, hanevelot looking man, Captain Louchlan McKay. In command of the Sovereign of the Seas, one of the famous old clippers that once made Americans proud of their merchant marines, Captain McKay left New York for San Francisco in August, 1851; the freight money amounted to \$85,000, a very large sum to-day; a barrel of flour in San Francisco in those days of gold fever sold for about \$45. Off Valparaiso, in a storm, Captain McKay's ship was dismasted but rigged up again, and reached her destination in 102 days, which was a quick passage. Discharging her cargo, the gallant clipper sailed for Honolulu and loaded with oil for New York, and made the extraordinary time of 82 days.

For 10,000 miles she sailed without tacking or wearing, and in 10 consecutive days she made 3300 miles. But the days of the noble old clippers are gone, and I went to see this veteran of the sea about the ships that trade with Greenland. His are the only vessels that go regularly to the far-off land of Kaue. They go out in ballast, for although Greenland imports wheat, brandy, coffee, sugar, tobacco and fire wood, it is not from this country. They bring back a metal termed cryolite, which they obtain at a port called Ivigtut, on the southwest coast of Greenland. It is a bleak country, even in the short summer, during two months of which, June and July, the sun is always above the horizon. Mosses, stunted shrubs, dwarfish trees and huckleberry bushes are about the only vegetation, and the bare mountains in the grip of the great glaciers and the generally dead and desolate aspect of the country make it appear as strange and unreal as that gray corpse of a world, the moon.

Cryolite looks like ice, and hence the name signifies ice-stone. It is all taken to Philadelphia, and is used in manufacturing soda, alum, lye, porcelain piano keys, door knobs, clock dials and other articles. The seven harks in the trade each carry about 800 tons of this strange mineral and make 14 voyages in a year. Last year they brought \$400 tons to this country. Those at Ivigtut are the only known mines in the world. Specimens of this mineral has been found in the Ural mountains and on Pike's peak, but no other actual mines but those in Greenland are known. It takes 20 days to go to Ivigtut and 30 to return. The Danish Government owns the mines, and they are worked by a company that pays a royalty to that government.

The vessels in this trade are built unusually strong in order to withstand the rigors of that frozen region; they have steel plates on the bow, iron on the stem or forward part of the vessel, double planks on the sides, and are filled in with timbers, and yet three years ago one of the stannoh barks was lost in the ice, and one that reached the open sea was never afterward heard from. The danger is not so much from icebergs as from the great blocks of floating ice or "flow ice." For eight months of the year, or in the winter season, it is a continuous night, and navigation is especially dangerous. During the four summer months of the year vegetation makes rapid progress, but it is of a dwarfish character, and the tallest trees do not exceed 18 feet. The greatest recorded cold of Greenland is 68° below zero, and the greatest heat 53° above, while the average for this year is 3° above zero.

The little port whence the supply of cryolite is obtained has a population of about 150 miners and as many Esquimaux. It is not a place that invites civilization, and the natives, debauched by the whisky of the Caucasians till the sale of that beverage has been interdicted, probably think they do not lose much by living in what the civilized usually regard as a lost land, captive in the grasp of the Arctic terrors that guard the awful approaches to that mysterious and fatal objective point of human ambition and daring, the North Pole.—O. W. Riggs, in Philadelphia Press.

## Concentrating Dakota Tin.

From the Rapid City Journal we take the following account of the recent concentration test of tin ore made at the school of mines:

The question of concentration as applied to tin has finally been officially settled at the school of mines. Dean Carpenter long ago expressed himself as confident that the tin rock could be easily handled by the jiggling process, and that that was the true method of concentrating it. The belt concentrators had proved partially successful only. Some time ago, 1800 pounds of tin rock was furnished the school of mines by Sam Scott, from his Sunday Gulch property. After many delays, more or less vexatious, this was finally run through on yesterday. It was broken and crushed in a jaw-crusher and a Cornish roll, and then put through the jigs. The tailings were carefully panned by many experts, and not a trace of cassiterite found. The jigs had saved all the tin in the rock. The process is a remarkably simple one, and the success of this experiment surpassed Dean Carpenter's most sanguine expectations. He did not think the jig would save all the metal, but it does.

The cost of crushing and concentrating by this process was stated once as being 50 cents

per ton. This is based on actual experience. At the Fresland mill near Idaho Springs, Colorado, galena and iron pyrite ore is crushed and concentrated by this process for an average of 37 cents per ton. The cost of the plant is much less than a concentrating plant similar to that used at the Etta. The trommels, jigs and huddles are not nearly so complicated and costly as their names would suggest, and the rock-breaker and Cornish rolls are the most simple appliances. The plant at the school of mines is large enough to handle about 10 tons of rock per day. A concentrating works can be put in at the mines at a most reasonable figure, and work can be done from the first on the certainty of success. The question of how to concentrate the tin rock of the Black Hills is no longer open.

## Ice and Brimstone.

Sulphur and sheol are usually synonymous in one's thoughts, and when we hear of a mine producing native sulphur, we intuitively think that it must be near the hot regions. Recently this element was found in the Queen of the West mine, over in the Horseshoe, under the brow of Gray's and Irwin's peaks. Like all other mines in that region, the Queen is a great producer of the mineral popularly known as ice, which extends from grass roots to a depth of over 300 feet. The entire vein is frozen, and vugs are found filled with masses of black ice, the color probably being derived from manganese, which occurs in noteworthy abundance.

Altogether the mine is a very peculiar one not only from being frozen, but because of the diversity of minerals found. Probably the largest masses of silver glance found in the State have been from this mine, and another remarkable circumstance is that nearly all the large pieces of glance were found in nodules of ice that fill vugs. Sometimes the glance assumes a very peculiar form of crystallization, consisting of elongated four-sided prisms, an inch or more in length, and a half-dozen or more of them grouped together, yet each independent and separated from the other, the ends usually terminating in massive silver glance. The more common minerals of our mines occur in greater or less quantity, and besides the native sulphur already mentioned, four forms of manganese are found. Alahandite, the sulphide of manganese, occurs in large quantities, and cubic crystals of the mineral are occasionally met with. Pink rhodochrosite, the carbonate of manganese, is found in rhombic crystals and small masses. The crystals are frequently dotted with small gray nodules, which react for manganese. Pyrolusite, oxide of manganese, is found in small quantities of a purplish color. Specimens brought over a few days ago consist of an intimate mixture of sulphur and the manganese minerals, together with about one-half per cent of silver.—Georgetown (Colo.) Courier.

GOLD AND SILVER OF COLORADO.—The precious and superior metal production of the State of Colorado to date amounts to something over \$300,000,000, or an amount equal to the earnings of 1200 men for 25 years, allowing \$1000 per year for each man. As extensive mining in this State does not date back as far as 25 years, and if it is an indisputable fact that the average number of miners employed does not aggregate 12,000 men, it must be apparent that a great profit has been made by those who advanced the money necessary to conduct the mining operations of this State. This assertion is further demonstrated by the vast amount of money disbursed by Colorado mines in dividends during the last decade. The total amount of dividends and profits paid by the mines of this State during the last decade will fall little short of \$50,000,000. This does not include the earnings from coal, iron and other mines. The production of the State may properly be divided up as follows: Gold, \$83,000,000; silver, \$180,000,000; lead, \$32,000,000; and copper, \$5,750,000, making a total of \$300,750,000. The accuracy of these figures is quite satisfactorily substantiated by various United States mint and geological reports and statistics compiled by the last census bureau. These aggregates show most creditably for a new country like Colorado, which only a score of years ago was regarded as comparatively valueless, and was separated from the outside world by nearly 700 miles of intervening and arid plains.—Denver Tribune-Republican.

CHARCOAL MAKING for the San Francisco market is about to be commenced on a large scale in Mendocino county as a result of the extension of the San Francisco & North Pacific railroad from Cloverdale to Ukiah. As but few of the owners of timber land in that section understand the manufacture of charcoal, contractors from this city are making arrangements to pay a certain price per sack to those who wish to clear land for the privilege of allowing the purchaser to place men on the land to cut off the timber and make the coal. By this arrangement the land-owners expect to have their ground cleared with profit and done quickly.

It is the intention soon to build a telegraph line from this city to Point Reyes, under the direction of the Signal Service office. It will be about 40 miles long, and construction and full equipment will cost \$5000.

## The Disease of the Emperor.

[Translated for the PRESS from *Le Siecle* by M. N. M.]

"What disease has the Crown Prince (Emperor)?" That is difficult enough to say even now. It is certain that the physicians are not in accord. One may justly conclude that his case is quite exceptional. It seems that a great deal was expected of the microscopic examination by M. Virchow, from the fragment of mortified tissue ejected by the patient, and which had been sent in alcohol from San Remo to Berlin. The report of M. Virchow seems to have been made with a view to a wide publicity. A report merely technical, and written for physicians only, would have, probably, been expressed in different terms. The impression which it gives is that the celebrated anatomist finds himself powerless to direct the physicians. Is it an attack of cancer of the larynx, or of tumor, or of tubercles developed in the larynx; or has there been in the larynx only a series of conditions like those which came what are called "clouds" (hoils)?

M. Virchow, in His Report.

Points out a certain analogy of appearance between the fragment which he received and the mortified part called "bourbillon" (core), which forms in a boil, and of which the discharge marks generally the cessation of suffering.

The greater part of the tissues of our body are in some way transfiles of special fibres, extremely delicate; yellow when they are in mass, elastic, and, above all, unalterable. They resist putrefaction, and even digestion in the stomach of an animal. The history of these fibres we may say was made known three quarters of a century ago by M. Chevreul. In the bourbillon which comes from a boil, these elastic fibres are distinctly recognizable; they have remained intact in the midst of all the other tissues which have rotted. M. Virchow has found them even in the fragment expectorated by the Emperor. It should not be forgotten that the parts thus thrown off by a patient are always dead, and often have been dead for a long time. They have lost their structure, their constitution. It is necessary, therefore, that the yellow elastic fibres may have the indestructibility which characterizes them in order to be still recognizable. It is not upon the mortified fragment examined by M. Virchow that he would have been able

To Find Again the "Cellules Cancereuses"

Of which there is also question in his report, and which he declares do not there exist. If they have been seen, it could have been only on the little fragments of the paroi (inner-side) of the larynx, and which have been carried off without doubt, intentionally, by the physicians, with the object of examining for such cancerous cells. This name of "cellules cancéreuses" sent forth to the public, requires some explanation. In order to better comprehend what we have to say, it is necessary to go back to the ancient belief upon tumors. The physicians in old times thought that a tumor was a sort of foreign parasite in our bodies, not a microbe, but a gross animal, a sort of internal vampire, which gnaws us. Now, there are certain tumors which seem envolved under the skin by radiant expansions. It needed only, then, that one should see in them some claws to arrive at the conclusion that

## The Devouring Animal was a Crab

—in Latin, "cancer"—from which has come the name of that terrible affection. In more than one old author of surgery of the sixteenth century we find engravings representing patients who carry in some part of their bodies this crab which gnaws them.

That others besides harbar surgeons may have veritably believed in the existence of this crab in the flesh, is very probable. Then, when an ulceration was forming it was the cancer, the crab, which had eaten the skin in order to nourish itself. Hence the strange treatment of the ulcerated cancers, which consisted in applying, at the shop of the butcher, a slice of fresh meat. It was intended to divert the voracity of the beast, in order that it might leave the patient tranquil.

However, science was moving on. At the beginning of the century it was discovered that a great number of tissues, such as those of the glands and of the epidermis, are made up of little juxtaposed bodies intimately united to each other, but each having in a certain measure its own life. They were called "cellules."

## The Length of Life of the Cells

Is not necessarily that of the bodies. Thus, in the glands, upon the skin, they live a very much shorter time than we do. They develop, mature and die, some in a few days, others in a few weeks. During this time they so multiply that finally the same number always remains, and the epidermis, or the gland, in undergoing this renewal, changes neither in form nor volume. When we examine under the microscope a particle of tumor or cancerous ulcer, we find still some cells, but very different from all the normal cells, and presenting nearly everywhere the same appearance. They are very large, with expansions and prolongations; they have the most fantastical forms, and reproduce themselves much quicker than the ordinary cells. Then, by a singular turn, we come back to the idea of a parasite. It was supposed that these cells were of a particular species, foreign in some manner to our nature. Without expounding upon their origin it was admitted that



they were intruders and that they were coming definitively to develop themselves in our bodies at the expense of its natural elements. The rest naturally explains itself. In order to live, these cells absorb the principles of the blood essential to the surrounding tissues, which, consequently, were left to be invaded until followed by death.

#### Such is the Origin

Of that expression "cellule cancéreuse," which for a long time designated something distinct from the organism, as the microbes are now. When that particular cell took birth (it is not said how) and developed itself at the lips, in the stomach, or in the larynx, the physicians declared that one had cancer of the lips, of the stomach or of the larynx. That doctrine, called the *specificité* of the cellule cancéreuse was introduced in France by Herbert de Zurich. He had been, at Paris, the friend and co-worker of the lamented Robin. The latter, however, much more learned, soon, by force of patient observation, completely upset the doctrine of "specificité." Robin demonstrated that the cellule cancéreuse was not at all a special cell as was believed. He collected a considerable number of facts, from which it clearly resulted that the cells of all the glands, or of all parts of the epidermis, were able in an indistinct manner, under unknown influences, to take on the character of the cancerous cells, to become more gross, to assume a bizarre configuration, a more active vitality, and, consequently, to invade the surrounding tissues even to the exhaustion and death of the patient.

It seems even from the text of the consultation written out by M. Virchow that the doctrine of Robin have now conquered the medical world after having been long combated, even in France, by the disciples of the celebrated German anatomist. It is true that this more scientific explanation of the affection called cancerous have made no fundamental changes, but it at least encourages the hope that perhaps some day there will be found the means to arrest by simple remedies, administered internally, the exuberance of life which takes certain cells of our body, and turns them to its destruction.

#### Field for Prospecting.

We feel that too much attention cannot be called to this county as an excellent field for prospectors, says the Nevada county *Transcript*. Almost all mining experts who have come here during the past year declare we have the richest mining county in the State, and our people are convinced of it. Since the pleasant weather began a large amount of prospecting is carried on. This is the most favorable season of the year for prospecting either for quartz or gravel, and all who are idle would do well to get out on the hills and try and strike something that would pay. There is an immense amount of ground in the various districts of the county yet unprospected, and one man has as good a chance of making a "ten strike" as another. In the older mining districts of the county there are undoubtedly rich spots and unopened claims which need enterprise and industry, backed with capital to open them. Every dollar and every hour's work spent in the development of the mineral resources of the county will result in the ultimate benefit of the county and the parties engaged in it. Some claim there is no certainty of making a strike, but in this respect our avocations are not much better than mining. Every business enterprise, and not a single exception can be named, is but an experiment, in which men venture money, in the hope, without a certainty, of getting it back. The farmer who sows his grains, and the merchant who buys a stock of goods, make ventures which may result in success or failure. Crops fail and stocks of goods become valueless, and in almost all kinds of business there is an uncertainty. The prospector who finds his gravel pans out well, or who strikes a ledge, giving evidence of richness, takes no more chances in making it than men often do in other kinds of business. Every kind of industry requires earnest labor, constant attention and a knowledge of work to carry it on. With these requisites in view, give the miner a pick and shovel and turn him loose in this county, and he will certainly make a living, and he more likely to get a fortune than in any other business.

**AN IMMENSE METALLURGICAL PLANT.**—A number of Spanish capitalists have united for the purpose of erecting a large metallurgical and shipbuilding establishment in the Basque provinces, at an estimated cost of about \$15,000,000. The Spanish iron-founders and shipbuilders have made great efforts to participate in the increased orders recently given by the Spanish naval and military departments, and a feeling has been expressed that where it was found absolutely necessary to confide orders to foreign houses the orders in question ought at least to be executed on Spanish soil.

THE amount of coal taken from the coal mines in the Mount Diablo range, in the county of Contra Costa, from 1861 to 1885, as shown on the books of the various companies, makes a grand total of 2,667,580 tons. Of this amount, 1,402,215 tons was taken from the Black Diamond mine, in Nortonville. The average is over 109,000 tons per year for the 25 years referred to.

#### The Fraser Wine Process.

When it was first announced that by the process for maturing wines and liquors discovered by Dr. E. J. Fraser of this city, every gallon of wine and brandy produced in this State could be fully ripened and fitted for sale and use each year, before the next vintage was placed on the market, the idea was at once scouted and pronounced impossible. The claims put forth were so revolutionary, and so contrary to all past experience, that people could not be brought to believe it. Even when the fact was brought directly to their personal knowledge by the treatment of their own wines, and the results seen and determined by taste and the opinion of experts, it appeared too much—too good a thing for some to believe, and many have continued doubting until after the fullest investigation by the most competent and highest authorities in the State has pronounced the claims for the process fully sustained.

#### What the Process Accomplishes.

Sweet wine and brandy taken immediately from the vintage after being subjected to the process for from four to six weeks, is ready for the market and use, as thoroughly aged as that treated in the usual way for two or three years. Dry wines require but three or four weeks of treatment, when, after being cleared of sediments by simple and well-known processes, they are fitted for use.

This result leads to the following economical facts:

The cost is a mere trifle, within the reach of all. It saves the usual large loss by evaporation. It saves the interest not only on the cost of the wine, but also on cooerage and cellars in which to store it. It saves much labor and insurance.

But perhaps the most important advantage gained is the possibility that small wine-growers and manufacturers will be able to hold and handle their own wines until they can be placed upon the market for immediate use, without paying large commissions to middlemen, or selling their wines directly at a ridiculously low price. The opportunity which this process gives the vineyardist and the small wine-maker enables him to handle even large amounts of wine with a very small capital and put into his own pocket all that there is in the business.

All these facts have been substantiated by the most crucial investigation and proofs.

The first ordeal was in the United States Patent Office. Here it was placed under the most severe tests of expert taste, the microscope, and chemical reagents by Prof. Clifford Richardson, of the Agricultural Department at Washington, assisted by Prof. H. A. Hueton, Assistant State Chemist of Indiana.

Prof. Richardson, in his report to the Commissioner of Patents, said:

"In each case I have been able to distinguish a decided difference in favor of the samples marked 'treated,' and that the invention is 'worthy of consideration.'"

The process has been patented in the United States and all the leading wine countries of Europe. It is covered by two patents.

The process has been thoroughly investigated by numerous experts and scientific men both in this State and at the East. Prof. Chas. P. Williams, Professor of Chemistry in the Missouri School of Mines, after thorough investigation, reported: "The changes produced in wines and liquors in the magnetic fields are not distinguishable from those effected by time."

Prof. E. W. Hilgard subjected the process to a most thorough and prolonged test in his laboratory at the State University, and made a most favorable report, which has been widely published.

During the professor's investigations he received for treatment a package of his best three-year-old wine from Jacob Schram of St. Helena. The wine was duly treated, returned to Mr. Schram, who subjected it to the test of wine experts besides himself, all of whom testified to the fact that the wine so treated "had been improved in every quality going to form a matured wine, such as softness, flavor and fullness, as also of age in contrast with samples of the untreated wine."

This statement goes to prove that even old wine can be greatly improved by the Fraser process. Mr. Schram says in reference to this experiment that "it went in three years old and came out 4½ to 5 years old," and yet the time of treatment did not exceed four weeks.

#### The State Board of Viticultural Commissioners

Was the last public institution to which the process has been submitted. This is a body in whom all the State has the fullest confidence in all things relating to viticulture. Sixteen samples of wine—port, claret and sherry—were submitted to the test. The following well-known wine experts went through them: Messrs. R. J. Harrison, Dr. J. A. Stewart, H. A. Pellett, E. C. Prieher, J. Pohndorff, H. W. McIntyre, N. E. Rose and I. De Turk. In every single instance the treated samples were given the preference over the untreated, and in many cases the expressions were very pronounced in favor of the treated. The test was a very trying one. Some of the wines tested were matured ones, all of which were pronounced "improved" by the process. There was no possible clew by which the committee were able to determine the treated and untreated samples except by taste, and yet there

was a pronounced difference noted in every instance.

#### These Facts Have a Scientific as Well as Economical Interest.

This new discovery is evidently that of the application of a natural law, applied in a more active manner than is possible by unaided nature. It produces natural results which, when left to the natural processes of time, are necessarily slow, tedious and expensive. Like all other discoveries, it at first met with doubts, old incredulity and opposition. But truth is mighty and always prevails. This truth has withstood the most crucial investigation, and has passed through it successfully. It is confidently believed by those who have examined most thoroughly into its merits that it will prove one of the most economical advantages to California that our people have ever met with. It will raise the viticultural interest from its present depressed condition to one of the most prosperous in the State.

#### To Be Introduced in Germany.

We understand that a wealthy German viticulturist came to California a short time ago and visited Dr. Fraser with the sole view of gaining a more thorough knowledge of the matter than he had been able to do by correspondence. The result of his visit was the purchase of the right for Germany, where he will proceed at once to introduce the process, which he considers one of the first importance and one calculated to work a revolution in the wine-making interest throughout the world.

Arrangements have been made to put up a plant in this city to be composed of 500-gallon tanks which will be in operation within 60 days.

#### Great Guns and Torpedoes.

There seems to be a difference of opinion in regard to the relative value for destructive purposes of great guns and torpedo boats. In a paper on modern weapons in naval warfare recently read before the British Institution of Naval Architects, Captain Huhert Greuffell, of the British navy, expressed a preference for guns over torpedoes as weapons, and expressed much doubt as to the value of torpedoes in naval warfare. Among other things he remarked: "In destructive effect I see the gun equal, if not superior, to the torpedo, and in many other important respects—in area of effect, in accuracy, reliability, strength and simplicity of construction—far beyond it; and I make bold to say that in my opinion it maintains these advantages throughout the whole scale of its application from top to bottom. That being so, I view with some surprise the tendency to supplant in some vessels the more powerful by the less powerful weapon, and I do not think this change will stand the test of experience and use."

Pertinent to the above we clip the following from a late issue of the *Philadelphia Ledger*: "In regard to the defective great guns that are being turned out by the British Ordnance Department comes the cable dispatch from London telling the American public that, in a naval sham fight off the mouth of the Thames on the same day, one gun hurst on the torpedo boat *Culew*, which seriously injured several sailors, and another hurst on the armor-plated ship *Black Prince* and hurt three seamen. All this makes curious sequence concerning British great guns: First, there are not enough of them to equip the vessels that need the guns, without dismantling fortresses to supply them; second, they seldom have enough of the special ammunition (special shells) they require to put them safely into actual battle or bombardment; and third, when there is ammunition enough the guns get hurst in short order. These facts come in the current news, and they would be grotesque if they were not real and on a subject of practical importance, which happens just now to have an immediate and serious interest for the American public, which is impatient to have great guns as the British have."

**THE BIG STEEL WORKS.**—At last it is definitely reported that a contract has been finally entered into between the Moss Bay Iron and Steel Co. of North Cumberland, England, and the N. P. R. R. Co. Under the terms of the contract the English company at an early date began the erection of very extensive works at some point in Kittitas county, probably at Cleelum, and the Northern Pacific is to extend the Cleelum-Roslyn coal branch railroad to the great Upper Cleelum iron and coal mines. Eighteen months will be required to complete the English company's iron and steel manufacturing plant, blast furnaces, etc., and they guarantee to the Northern Pacific sufficient traffic to warrant the extension of the coal branch. The Northern Pacific also undertakes within six months to have in operation a short spur connecting the English company's coal mines with the main line, and the latter company will at once build large coke ovens for requirements of their furnaces. Ellensburg people are jubilant in consequence of this intelligence, as all supplies necessary for sustenance of the 2000 men who will be directly employed by the English company, together with the consequent host of camp followers, will of necessity always be drawn from this fertile valley.—*Ellensburg (W. T.) Capital*.

THE Alameda sewer-pipe manufactory is working upon a \$100,000 order from San Diego, and a \$70,000 order from Pasadena.

#### Industrial Enterprises in the Interior.

Nothing more certainly shows the permanency of the new era of prosperity upon which California has entered than the movements in behalf of new industrial enterprises in the interior which are constantly being made. When new and additional manufacturing and mechanical enterprises are being set on foot in interior towns, it is because capitalists have full confidence in the continued and rapid growth of such towns. Ten thousand dollars so invested is worth more to the State and its industrial progress than \$100,000 of speculative investments in land. In fact, it may well be feared lest the numerous large land sales and the high prices which are being realized from such sales may have an unfavorable influence on the growth of the State. It is pleasant, therefore, to consider this other phase of our progress as intimated above. A single mail, a few days since, brought us the following particulars of several new industries which are just now being inaugurated.

#### Novelty Works for Eureka.

The *Eureka Standard* says that H. M. Billings, from Kilbourn City, Wisconsin, has been in that vicinity for some time, investigating the prospects for the establishment of a novelty works industry, and is so well pleased with the result that he has secured a location in that city, and has gone to San Francisco to procure the special machinery required for the business. Mr. Billings will commence operating upon a moderate scale with the intention of adding new machinery and enlarging the business from time to time. The business will consist mainly in manufacturing our redwood bark, burls, stumps and the numerous other varieties of woods in abundant supply in this section, into ornamental, useful and unique articles, which will be sold extensively all over the United States and in Europe, and thus add wealth and prominence to that locality.

The promoter of this enterprise first went to Florida and bought land on which to start an orange orchard. Before doing so, however, he resolved to visit California, with which he is so much better pleased that he has resolved to change his plans as above. He thinks California is far ahead of Florida in every respect.

#### An Ice-Plant for Woodland.

The *Yolo Mail* informs us that ground has been broken on the north side of Woodland near the site of the woolen-mill for the erection of a large ice-plant. The company consists of C. S. Day, D. Hays, L. B. Adams and H. H. Henly, all of Woodland. The capital stock is \$30,000, divided equally between them. The plant is of the low-pressure system, and will have a capacity of about 10 tons daily, and is manufactured by G. W. Stevens of San Francisco. The engine is manufactured by Byron Jackson, San Francisco, and is one of the latest improved automatic cut-off and balanced valve engines. The boiler is of the Hazleton type, and both the engine and boiler will be of sufficient size to run additional machinery should it be necessary to increase the capacity of the plant. The machinery will all be placed on concrete foundation, and money will not be spared in putting in everything first-class and of the most durable kind. The ice will be made of water, thoroughly filtered. The ice will be frozen in blocks weighing as high as 200 pounds each. The company propose to do a wholesale and retail business with headquarters at Woodland.

#### Foundry and Machine-Shop for Pasadena.

The enterprising and growing city of Pasadena, in Los Angeles county, is about to add to its other industrial enterprises a foundry and machine shop. According to the *Pasadena Union*, Mr. John A. Hans is making arrangements for such an enterprise. He asks the city and Board of Trade for certain privileges, and in turn will perform certain things which will result in giving Pasadena a good machine-shop and foundry. The business would not be very extensive at first, perhaps giving employment to 20 men or thereabouts, but the demands of this rapidly growing city will soon have the effect of extending the business to much grander proportions. Of course the citizens of Pasadena will not fail to meet the reasonable request of Mr. Hans, and provide themselves with a much-needed industrial convenience direct at their doors. Hitherto Pasadena has been compelled to depend upon Los Angeles for such work.

#### The Baker Iron Works

In Los Angeles, says the *Union*, "do an immense business. All of the iron columns used in Pasadena are manufactured there. All our street-cars come from Los Angeles, and there are not over a score of them and more coming. These cars need repair and must now be sent to Los Angeles every time repairs become necessary. There are a thousand and one things of this sort which may as well be done in Pasadena as elsewhere."

**A BLAST FURNACE FOR CHINA.**—The Teesik Iron Works Co. of England has secured a contract for the construction of a complete blast furnace plant, with all the necessary machinery, for China. This will be the first blast furnace ever put up in the Celestial Empire, and its progress will be closely watched by the outside "barbarians." All furnaces hitherto in use in China have been of the ancient oriental type, such as have been in use in Asia and Africa for a thousand years or more.





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W. B. EWER.

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SAN FRANCISCO

Saturday Morning, May 12, 1888.

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## Business Announcements.

[NEW THIS ISSUE.]

Quicksilver—J. B. Randol.

See Advertising Columns.

## Passing Events.

The recent rich strike of gold ore between Julian City and the Stonewall mine, San Diego county, may eventually lead to other discoveries. Although the Julian mines have been known for 20 years, no discoveries between the two points mentioned have heretofore been made.

The failure of Wm. T. Coleman has had the effect of causing assignments to be made by the various borax mining companies in Southeastern California and Southwestern Nevada. It is thought, however, that the difficulties will soon be settled.

A good many new strikes and discoveries are being reported just now, as is generally the case in the spring when the prospectors start in for a vigorous campaign in the mountains.

The bullion product of the Comstock is now greater than it has been for some years, and the prospects are that it will still further increase. The mines are now being worked more systematically than ever before, and with more freedom from stock-board influences.

The Chinese of San Francisco are about to build a large hospital for the care of their sick. It is to be free to the poor Ohinamen throughout the States. The Chinese Emperor has indorsed the project. Up to this time \$50,000 has been raised by contributions.

## Wide Distribution of Our Mineral Resources.

In a late number of the PRESS we had something to say about the great variety of mineral products to be found on the Pacific Coast, giving some reasons why these products had heretofore been so little utilized, more especially in California. Continuing this line of remark, it may be observed, this class of our resources is not only greatly varied, but they occur here more widely and evenly distributed, being at the same time more accessible than in most other countries. Elsewhere the mineral deposits, particularly the ores of the precious metals, are apt to be found only in the mountainous districts or in other localities remote from the agricultural and thickly settled portions of the country.

Looking to Mexico, for example, we find most of her mines located far up in the rugged mountains, accessible only by steep and difficult trails, over which mule trains alone can make their way with safety, the same being true, as a general thing, of both Central and South America. In Peru and Bolivia the principal silver mines of the country, the only ones ever much worked, are situated high up in the Andes, the more important of them being above the line of perpetual snow.

Very different is the situation in California as well as in most of the other Pacific States and Territories. In this State our principal gold belt, which stretches along the lower declivities of the Sierra Nevada, has an average elevation of hardly more than 2000 feet, much of it being less than 500 feet above tide-water, and nearly on a level with the great valleys lying to the west. We have gold-bearing bluffs hundreds of feet high so abutting on the ocean that the surf has in time past washed large portions of them away. To the north of these bluffs the sea beach has for a distance of more than a hundred miles been extensively worked for the gold it contained, washing the auriferous sands being still carried on there at a few places.

The foothill region of the Sierra, occupied by our main gold field, is easily accessible in all its parts, its slopes being so gentle that railroads climb it without any trouble. Scarcely any of our metalliferous territory lies at a greater elevation than five or six thousand feet, except some small portions situated to the east of the Sierra Nevada mountains, nor is the highest anywhere very difficult to reach.

As regards the distribution of the various metals and minerals in California, it may be said, there is scarcely a county in the State but contains valuable deposits of one kind or another. Gold mines are being actively worked in 33 of the 52 counties into which the State is divided, and both gold and silver mines in 9 or 10 of these counties. Valuable quicksilver deposits occur in Napa, Lake, Sonoma, San Luis Obispo and Santa Clara counties. The most of these are now being worked, [California being one of the few countries in the world containing cinnabar, the ore of this metal. Copper mines are being worked in Nevada, Calaveras and Amador counties, copper ore being plentiful elsewhere in the State. Heavy beds of borax are found in Inyo and San Bernardino counties, whereat some eight or ten million pounds of this salt are manufactured every year, this being another mineral product rarely met with outside of California. While the most of our petroleum crop is gathered in Ventura and Los Angeles counties, the presence of the earth oils in quantity is indicated at several points along the coast as far north as Humboldt county, also at various localities in the interior.

Boring for natural gas has been prosecuted at a number of places in the State, and at some of them with results that denote a final success. We have asphaltum enough to supply the wants of the world, the principal beds occurring in Santa Barbara, Los Angeles, San Luis Obispo and Santa Clara counties, those farthest separated being hundreds of miles apart, as is the case also with the petroleum and many other of our mineral products. From the chromium deposits of Del Norte to those of San Luis Obispo the distance is more than 500 miles measured in a direct line.

Iron ore in great abundance and of a superior kind, also coal of moderately good quality, occur in at least half a dozen counties in this State. Of the plastic and useful clays, lime and building-stones, cement, graphite, gypsum,

infusorial earth, chalk, asbestos, mica and ochre, we have enough; of salt and soda, overmuch, there being places where there is more of these commodities than is really desirable. Our lead-silver mines turn out a good deal of the former metal. We have beds of sulphur, not very extensive nor at present worked; plenty of rock-coap and some of the ore of antimony, from which a considerable amount of that metal is every year extracted.

While in California these natural products occur in greater variety and are more generally disseminated, probably, than anywhere else in the world, the other Pacific States and Territories are not by any means deficient in this respect. Of the 15 counties in the State of Nevada, there is not one but contains numerous deposits of gold or silver, some of which are being actively worked. There is, in fact, hardly a mountain range in that State, and it contains of these a great many, to which the above remark will not apply. And what is true of Nevada is equally true of Arizona, Utah, Idaho and Montana. Nearly every mountain range in these Territories contains metalliferous veins and other mineral deposits of value, and although little is now being done with them, the time will come when they will all be worked and turned to profitable account, affording aid to many other industries, which, in regions possessing such limited agricultural resources, could otherwise never attain large proportions or even gain foothold at all. And thus these useful metals and minerals, at present so neglected and looked upon as of little moment, viewed prospectively, are of the greatest importance.

## The California Gold Belt.

It begins to look now, after waiting for about 40 years, as if the gold belt of California would be properly examined by trained geologists. This State spent several hundred thousand dollars in trying to get our gold fields investigated and maintained a State Geological Survey for some years. The results were volumes on ornithology, botany, paleontology, and one on geology—not economic. But the features which the miners wanted examined were put off so long that finally, in a spirit of indignation, the survey was stopped abruptly, and the State Geologist sent about his business. He afterward published "The Auriferous Gravels of California," under the auspices of an Eastern college, and few copies are in this State. But the features connected with the quartz mines of California have never been properly examined and reported on. When the State Mining Bureau received an appropriation at the last session of the Legislature, it was stipulated that a certain proportion was to be expended in field work. The trustees decided to investigate first the oil, coal, asphaltum, and natural gas, and the report on them has recently been published. This resolution deferred the examination of the gold mines for another year.

At last, however, it was decided to examine the gold mines. Mr. Melville Attwood is at work on the wall rocks, Mr. O. H. Aaron is investigating the details of gold-ore milling, and other State Mining Bureau assistants have recently commenced on other departments. The U. S. Geological Survey, which did some field work in the gold districts last season, is about to start in for this year. A dispatch from Washington states that "three parties go to the gold belt of California under the direction of H. N. Wilson, with R. N. McKee and A. F. Dunninton as assistants; two to the Cascade mountains in Southwestern Oregon under W. T. Griswold, with Eugene Ricksecker, and three to Montana under E. L. Douglass, with Messrs. Frank Tweedy and E. T. Perkins as aids. These parties are compelled to start at an early date in order to finish the work of triangulation before the summer haze sets in. They will have that done by the 1st of July, and the time from then to the middle of November will be devoted to topography and working out the details of triangulation. The county charts of California are on a scale of two miles to the inch, and of Oregon and Montana four miles to the inch. The California parties will cover about 2000 miles each, and the Oregon and Montana parties from 3000 to 4000."

CARNEGIE has opened a bank for his 10,000 employee in Pittsburgh. He proposes to receive deposits up to \$2000, paying six per cent interest on all deposits.

## Borax and the Tariff.

A member of the firm of Wm. T. Coleman & Co., in speaking of their recent failure, assigns as the principal and immediate cause of that disaster the inability of the house to dispose of their borax property, negotiations for the sale of which were pending and about to be consummated, when the threatened removal of the present duty on that salt caused the prospective purchasers to break off further negotiations.

Now borax has not yet been placed on the free list, nor is it likely to be. A majority of the Committee of Ways and Means in the lower branch of the National Legislature have simply reported in favor of such a measure—that is all. Why then did these proposing buyers of Mr. Coleman's property decline to take it? What was the reason of their so suddenly bolting the transaction, there being, as they must have well known, so little likelihood of foreign borax being admitted into this country duty free? Simply this: Capitalists will not invest their money in a business that is *threatened* in the manner this borax industry has lately been in the Lower House of Congress. It is not, in this particular instance, a change they are so much afraid of as this constant agitation for a change, which, by keeping the market in a feverish and unsettled condition, renders the business of the producer unsatisfactory and precarious. Moneyed men do not care to subject themselves to this sort of annoyance. They will not readily engage in a calling that is exposed to be buffeted and badgered by every callow politician on the hustings, or to be menaced by the cranks who take occasion to ventilate their pet theories in the halls of Congress. It is said that capital is always timid; but it sometimes shows itself prudent as well.

But, after all, it behooves us to inquire what would be the result of placing borax and similar commodities on the free list when the mere talk of such procedure causes so much consternation among proposing investors. "If these things happen in the green tree what would take place in the dry?" If sales of borax properties are to be defeated by such faint possibility of this salt being left unprotected, what could be done with them were the protecting duties actually removed? The industry on this coast would, in that event, have to succumb to foreign competition; such at least is the opinion of our home manufacturers. Mr. Coleman's borax property producing actively is valued at \$2,000,000. What would be its valuation were this production to cease with little prospect of ever being resumed? If anybody is to stand out for a reasonable protection it ought to be, we should think, Mr. Coleman and his creditors.

## Fresno Mines.

We are informed by a correspondent that there is considerable activity in mining and milling at Grub Gulch, Fresno county. The Josephine Company are running a large force of miners day and night. They have a 20-stamp mill with eight Frue concentrators and the latest improved Corliss engine for mill and mine. Their new chlorination-works are almost completed, and the masons are now building a fine reverberatory furnace. The carpenters are putting the finishing touches on a very convenient laboratory. The company have over 100 tons of rich sulphurets on hand ready for treatment. Mr. Little, the resident-manager, seems the right man in the right place.

The Gambetta mine, Mr. John Heley, owner and manager, for some reason is not doing much at present, though he has had a successful and steady run all winter with his little "Donkey mill."

The Antelope and Red Rover were recently sold, and the owners are working a large force of miners in and about the mines, and are putting up a mill and hoisting plant. The Grand Prize and Butterfly, owned by Mr. Pool, are showing fine ore, and a mill will soon be erected. Times are lively, and everybody is at work in and around the camp.

**THE RUSSELL PROCESS.**—A full description of this leaching process, in its practical application and economic results, has been compiled from Mr. Russell's notes by Ellsworth Daggett of Salt Lake. It is published in pamphlet form by the Russell Process Co., New Haven, Conn. This is the most complete thing on this subject ever printed, and will interest metallurgists everywhere.



## Working Auriferous Gravel.

## A New Plan Being Tested.

We have made brief mention of the fact that Mr. Gideon Frisbee, one of the inventors of the Frisbee-Lucop mill, has devised a plan for working auriferous gravel dry, which is being tried in this State, and are now able to give further particulars. By the plan proposed, after the cement or gravel in the bank is broken up in the usual way, or gravel taken from the drift, it is loaded into cars by hand, or automatic power-shovel, run to the mill. Here it is dumped into the upper end of a rotary grizzly 16 feet long by 4 feet inside diameter, formed of iron or steel bars four inches wide and 1½ inches thick, set radially with their edges toward the center, with spaces between the bars of five-eighths of an inch, the whole cylinder resting on rollers. It has one end lower than the other, and is revolved at the necessary speed by suitable gearing. The cement is tumbled over and over, the bowlders contained breaking up and disintegrating the mass which is all the time traveling toward the lower end. The finer portion is discharged between the bars, and the coarser, which carries no gold, is discharged from the lower end into cars, removed and dumped.

The fine matter passing through bars falls into an ore-bin from which it runs to a wet mill and is reduced so that all will pass an eight-mesh screen. This makes it fit to pass over plates without scouring off the amalgam, and brightens the rusty gold. After this it passes over plates in the usual way, or may be saved by any of the usual appliances for saving gold in quartz mills.

The wet mill has a capacity of 100 to 150 tons per day through an eight-mesh screen, and as but one-tenth, or possibly less, of the total amount of gravel will be worked over plates, it is only necessary to have sufficient capacity in grizzlies to work 1000 or 1500 tons per day.

The removal and working of such an amount by dry process may seem difficult, but larger amounts of rock are being worked by a more expensive process (for other purposes) at a cost of five cents per ton. Mr. Frisbee is of the opinion that the method of working gravel is as cheap, taking everything into consideration, as by the hydraulic process. He is also confident that two or three times as much gold will be saved. As for milling, it is all coarse gold and easily caught on the plates. No objection can be made on account of debris run into streams, as all coarse stuff is run to a dry dump and only mill-tailings run off by water. The claims made for this method of working gold gravel are its simplicity, small cost of plant, and the much greater saving of gold, the waste and loss by hydraulic being very great.

## Measuring Quartz Screens.

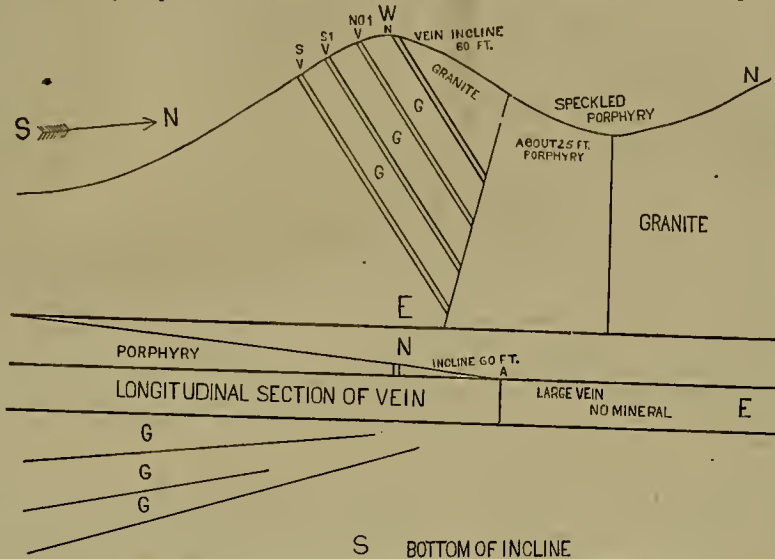
We have been shown one of Mr. Melville Attwood's micrometers (not patented), designed for the use of quartz-mill superintendents. It is a very small vest pocket instrument by which the diameter of the apertures in different punched, slot and wire screens can be measured with tolerable accuracy. For instance, the diameter of the aperture in a No. 50 brass-wire screen is shown by it to be only the one-hundredth of an inch, and No. 5 punched screen, three-hundredths of an inch. In a No. 8 slot screen the diameter of the slot is two-hundredths of an inch. The little instrument costs but a trifle and is quite useful. It is being made by Leitz & Co. of this city. In appearance it is similar to the little glasses used for measuring the threads in cotton goods, but there is a scale engraved upon it which adapts it to the new purpose. By it can also be told the number of holes to the inch in any screen, and small grains of quartz may also be measured by it. Those mill superintendents who are particular in their work will find this little instrument a very handy one for the purposes indicated.

SENATOR STANFORD offered an amendment to the River and Harbor bill in the Senate, increasing the appropriation for the improvement of Oakland harbor from \$200,000 to \$500,000. Both Stanford and Stewart propose to insist upon this amendment, believing that the work at Oakland should be performed at once, and that the demands of trade warrant the expenditure immediately of the full amount recommended by the engineer.

## Exchequer Mining District.

EDITORS PRESS:—I would like to hear from some of your readers an explanation of the geological formation of this district, so as to learn if it has any resemblance to any other district in this State or in the adjoining States or Territories.

The principal characteristic and a decidedly prominent one is its dyke formation. The dykes cut the granite east and west nearly, with a very slight variation. The district is about 3 miles long and about 2½ miles wide, where mineral-bearing veins have been found. The principal mine seems to be a



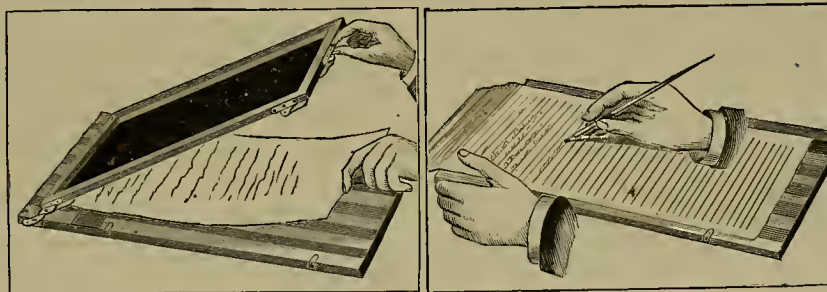
## GEOLOGICAL FORMATION IN EXCHEQUER MINING DISTRICT.

blow-up of ore of a "chimney" character, although no large bodies of ore have been found. No shaft has been sunk more than 60 feet. This shaft was sunk on one of four veins 20 feet apart, both walls in granite, until at the bottom of the 60 feet, where a six-foot vein was apparently cut clear off and butted against a perpendicular wall of porphyry slightly inclined to the south. The following figure would represent a cross-section running through the incline, which dips at an angle of 45°. The porphyry contact is soft and resembles talc, and gives only a trace of silver.

The vein dips about 6 feet in 20 going west at bottom of incline. At A there would be

the corrugations of which are so close as to be nearly imperceptible. The writing on the stencil sheet is done with a smooth steel stylus, which is about the size of a well-sharpened lead pencil. The paper is perforated from the under side, leaving the stylus free to roam at the will of the writer; the corrugations on the plate affording just enough resistance to the pen to prevent slipping and make the writing easy and natural.

The accompanying cuts show the appliance and method of application. After the sheet is written it is stretched on the frame. The sheet on which the copy is to be made is placed on a pad beneath, the frame closed, and an inked



## EDISON'S MIMEOGRAPH.

only a few feet depth of vein, and west of the incline the vein increases in depth, as stated above. Shall I look for ore in the porphyry or follow the vein going down west? Fifty-one tons has been shipped—40 from incline and 11 tons on the croppings going west, giving 44.25 per ton average assays. In the incline it gave \$7000, \$1823, and as high as 1027 ounces silver and 180-100 ounces gold, on the south vein, from croppings, and from 1 to 300 ounces on the middle veins in spots. Pieces of ore have been picked up weighing 23½ pounds, assaying 421 ounces silver and one ounce gold, and one piece 724 ounces silver and 90-100 gold. A number of veins assayed from 1000 to 3000 ounces, but gave out or were cut off by porphyry at depths of 10, 12 and 20 feet in hard porphyry. The four veins have not been opened down to the porphyry contact, except the north vein, which was 60 feet in length. I think a description of underground work showing positions of veins, faults, slips and dykes, would be very instructive as well as entertaining. This district is eight miles north of Homer station, on the A. & P. R. R., in San Bernardino county.

PROSPECTOR.

THE American Institute of Mining Engineers holds its 51st meeting at Birmingham, Alabama, on May 15th.

## The Mimeograph.

The mimeograph is a new appliance invented by Thomas A. Edison, to take the place of the electric pen, also invented by himself. It is intended for manifolded autographic and typewriter circular letters, quotations, reports, specifications, copying music, programs, etc. The writing can be done with the same facility as though pencil or pen were used on common paper. As many as 3000 copies can be made from an original.

The manner of making the stencil or first writing is very simple. A sheet of thin sensitive paper is laid over a finely grooved steel plate,

## The Sutro Tunnel

An adjourned meeting of the Sutro tunnel stockholders was held Friday of last week for the purpose of electing a Board of Directors. H. G. Sieberst, one of the stockholders, said that under the code the adjournment had not been legally ordered, and any election then would be invalid. Edmund Tansky maintained that the meeting was convened in accordance with the by-laws. There was considerable discussion, some of it of quite a heated nature.

The Landers-Sieberst party withdrew, and the Lillenthal-Tansky men, claiming to represent 1,117,899 shares out of 2,000,000 shares in the corporation, elected the following as their Board of Directors for the ensuing year: Theodore Sutro, P. N. Lillenthal, H. H. Thayer, F. A. Benjamin, M. B. Clapp, George E. Butler and Edmund Tansky. At a subsequent meeting Theodore Sutro was appointed president; P. N. Lillenthal, vice-president; Pelham W. Ames, secretary; C. C. Thomas, superintendent; Anglo-California bank, treasurer; H. H. Thayer, assistant secretary and New York transfer agent; Theodore Sutro, attorney and counselor; California Safe Deposit and Trust Co., San Francisco and California registry, and Union Trust Co. of New York the New York registry. Secretary Pelham W. Ames refuses to give up the books of the corporation to either party until he has obtained legal advice.

Since then John Landers, Moritz Meyer and Frederick Roeding have brought suit in the Superior Court against the Sutro Tunnel Co. to set aside the election held on the 4th inst., at which it is alleged Theodore Sutro, H. H. Thayer, M. B. Clapp, G. E. Butler, E. Tansky and P. N. Lillenthal were chosen directors, and the secretary was instructed to cast the vote of 1,117,899 of the shares for them. The complaint specially declares that all of the 1,117,899 shares represented and voted by P. N. Lillenthal as proxy were owned by others, and that, in fact, ten shares were all that could be voted by persons present.

THE Hale and Norcross paid \$56,000 in dividends this month, the first dividend for many years. The record of the mine is as follows: Total assessments levied, \$5,086,800; total bullion product of mine, \$3,374,224; total dividends, \$1,654,000. So whatever was the cost of the work, upward of \$8,000,000 of new wealth has been added by this mine. The assessment money merely changed hands, and was not lost. There are \$3,000,000 in circulation more than there were before the mine was opened, and this money is distributed among the people.

ROBERT J. STEVENS, United States Consul at Victoria, in a letter to the State Department says: "There is a division here as to the employment of Chinese, even among the miners, as many of them are paid by the ton of coal that they mine, and they sometimes realize \$4 and even \$5 per day. These men employ Chinese at \$1 or \$1.50 per day to shovel and load vans, and sometimes even as tamers. The white miners perform but very little heavy labor themselves."

COAL shows no change; receipts in April were 94,550 tons, making a total thus far this year of 332,750 tons, against 341,000 tons during the same period in 1887. Supplies continue light and prices firm. The coast collieries are increasing their output, but there is a marked falling off of shipments of foreign grades. For house purposes, the consumption is lighter, but our manufacturers are all running full time, most of them being in arrears with their orders.

W. A. CLARKE, owner of the Butte Reduction Works, has ordered from Fraser & Chalmers of Chicago a full equipment of the most modern and approved machinery. He will increase the capacity of his already big plant to 200 tons per day. The works will be driven by a 100-horse power Corliss engine and lighted by 100 incandescent lights. The cost of the same will be nearly \$100,000.

At the meeting of the California Academy of Sciences, on Monday evening last, Prof. Joseph Le Conte read a paper on "The Most Probable View Regarding the Interior Condition of the Earth."

THE receipts of quicksilver in April were 2289 flasks, and for the first four months of 1888, 9437 flasks, against 7938 for the same time last year. The exports for the four months were 5164 flasks, against 5143 for the same time last year.



## MECHANICAL PROGRESS.

## Breaking of a Large Steam Engine.

The havoc produced by the breaking of any important portion of a large steam engine was most vividly illustrated when one of the largest condensing beam engines in Brooklyn, N. Y., was running recently, apparently in perfect order, when suddenly there was a sharp snap, then a general grinding of heavy iron, steel rods and bars, and the powerful engine was destroyed.

The engine was in the jute manufactory of Buchanan & Lyall, which is on President, between Hoyt and Bond streets. The engineer who was in charge of the engine was just about to stop it for the day when the crank pin strap broke. This strap is a piece of wrought iron six inches wide and four inches thick, which connects the crank by means of the connecting rod to the walking beam. The connecting rod was thus loosened at one end and went flying about, wrecking everything it touched. The 50-inch piston was thus released, and it descended to the bottom of the cylinder and cracked the lower head. The force of steam sent the piston up with great violence, and the upper head of the cylinder was also cracked and torn off. The engine-room soon became filled with steam, and the work of destruction continued. The connecting rod in its descent struck a large brace, and thus made a lever of the walking beam that was being forced down with tremendous power. This force and resistance snapped off the three-inch bolts which hold the caps to the upper part of the galloways frames, and the frames, which were four inches thick and six inches wide, were broken to pieces. Large pieces of the wrecked engine were hurled in all directions, and everything in the room was more or less damaged. The plunger pump was a total wreck, and the air pump rods were broken as though they had been straws.

The engineer and his fireman stood bravely at their posts, and although the room was filled with steam, through which 100 pound chunks of metal were flying in all directions, they managed to reach the stop valves on the boiler and cut off the steam from the broken engine. The momentum of the big fly wheel was enough to keep the broken shafts and rods in motion for a few minutes after the engine had been a total wreck, and the broken pieces continued to smash things until at last they lost their power and quieted down like an expiring demon.—*Ec.*

## Boiler Management.

A correspondent of the *American Machinist* writes upon the subject of boiler management as follows: There are engineers and steam-users who pay no attention to holding steam over night. Perhaps in no other way will so small an amount of work repay one so abundantly and so quickly. Of course, the direct return is fuel saved, while the indirect (and not the least) is the increased life of the boiler by reducing very largely the expansions and contractions. One would suppose that this would be a stale truism, yet the fact remains that a great many stationary boilers are easily neglected in this respect.

I give an experience for the benefit of whom it may concern. I took charge of an old plant. No damper; furnace doors out of shape and the walls leaking. I put in a good-fitting damper, and refitted the doors so they shut tight. The result was, it held steam until midnight. Then I took fire-clay mortar and went over the walls, inside and out, and then could hold steam easily. Have 20 pounds of steam at 6 A. M.; do not bank any fire; and lastly, save 200 pounds of coal daily over the other practice.

When it is impossible to put in a good damper, owing to the shape of breeching, take a piece of sheet-iron and cut it out to fit the front head, so as to cover all the tube ends. It should be stiff enough to stay flush up to each tube. A pair of side braces, swinging from a rivet, may be put in so as to hold the cover in place. By putting in this cover, after shutting down, one can easily hold steam.

I wonder how many boilers get the fire surface of the shell cleaned except when down for repairs. I saw one bright fellow—now retired—use the hose, but I don't think it did the wall any good. To clean properly nothing is better than a wire brush. There is nothing prettier about the job, nothing that makes your helper desire to wade in and earn glory, and generally he has business somewhere else at that time. Using soft coal and shavings, I find it pays to clean the shell every two weeks. It is also an excellent time to observe this or that steam, rivet or tube, and thus be able to detect any new defect, and one will sleep better, having done his whole duty.

**MODERN WARFARE.**—The *American Machinist* says that the prosecution of modern warfare has settled down to a contest of mechanicians. Hereafter personal bravery and strategy will play a second part in warfare, and mere numbers will count less than ever before. The nation whose mechanicians furnish the best guns and equipments of war, and make impenetrable vessels and forts, will win the battles. Even peace is an expensive luxury in these times, when the earnings of the multitude must be spent to keep up the semblance of an invincible front. But, after all, it is better

that the mechanicians of the world shall settle battles. There is sure to be fewer battles, because the chances of success can be better weighed beforehand. And in the processes of building war-ships, armored forts and guns, there is a possibility of learning something useful and of general application. Let the mechanician come to the front, by all means. It is better that the contest be one of mechanical skill than one of mere weight of numbers. It is better in every way to spend money in preventing than in prosecuting war.

**SUPERHEATED WATER FOR MAKING STEAM.** A company has recently been organized in Boston for distributing superheated water, which, after being conveyed to a distance, is instantly converted into steam for running engines. The *Boston Journal of Commerce* is employing water so heated for running its engine. The boilers which furnish the water are located several blocks away, and for several days, says the *Journal*, there has been no fire in our building for either heating or power purposes. This is the first power plant which has been run by this system in this city, and its practical success exceeds all expectations. Our 6½ x 8 Armstrong & Sims' engine runs quietly along at 300 revolutions without any symptoms of entrained water, and, whatever the changes of load, the gauge by its side varies scarcely perceptibly from 70 pounds, at which it is set. The boilers at the station are run at a pressure corresponding to 400° F., and the water at this temperature is circulated through the mains. Service pipes lead to a "converter" placed in our basement, where the pressure is reduced, in our case, to 70 pounds, a portion of this water being above the temperature, due to that pressure, is converted into steam, and the supply of water is controlled automatically, so as to maintain the desired pressure in the condenser, from which the steam supply from the engine is drawn, just as from a boiler. The manifold advantages from this system are obvious, and if found practical after long experience, will prove the greatest convenience since the introduction of gas-mains and their service pipes.

**THE DESIRABILITY OF REGULAR MOTION FOR MACHINERY.**—It is always desirable that the motion of a machine should be regular. Even supposing that the first mover is perfectly constant and equal in its actions, the machine may not be regular in its movement, from the irregularity of the resistance to be overcome. But still, says a contemporary, if both the power and the resistance were perfectly regular, the machine would not be perfectly uniform in its motion, for there are particular positions in which the moving parts of a machine are more efficacious than others, as in the crank, for instance; hence the energy of the first mover will be unequally transmitted, and irregularity in the motion of the machine will constantly follow. The motion of some machines bears a constant tendency to accelerate, others to retard; and others alternately to accelerate and retard; and, perhaps, in no case whatever can the motion of a machine be said to be perfectly uniform; but common sense will point out the necessity of having the motion as uniform as it can be made, else it will increase in proportion as it is multiplied through the machinery.

**TUBES FOR BELLS.**—It has been found that brass tubes, when properly annealed and suspended in a vertical position from a point near the top and struck at a point above the point of suspension, have resonant qualities far superior to bells, especially when comparative weight and cost are considered. This fact has been made the subject of a German patent, and tubes are being used there for chiming in church towers. Walter H. Durfee of Providence, R. I., who makes fine hall clocks, is making use of these tubes for chiming, which are rung by the clock movement at regular intervals, and while in his shop recently we saw some clocks in which surprising results were attained in point of purity, clearness and volume of tone, by their use. Some idea of the comparative efficiency of tubes for the purpose is obtained from the fact that a tube three inches diameter outside and one-half inch thick, twelve feet long, can be easily heard at a distance of one mile, and under favorable circumstances two or three miles.

**SULPHUR AND SALT IN BOILERS.**—Water containing sulphur and salt will so act on iron as in time to make it soft as "black lead," and may therefore be considered injurious to a boiler. A good lime-extracting heater should be used when the employment of such water cannot be avoided. Salt water, similar to that of the ocean, will not injure an iron boiler, but if a high pressure is carried salt will be precipitated. When salt water boils, fresh water is evaporated and salt remains, in the proportions of 36 parts salt to 100 parts of water, after which the salt will be deposited in the boiler. The use of a Salinometer (an instrument to determine the strength of brine or salt water) is recommended, in order that the superheated water may be blown off and extra feed-water introduced.

**RAILROAD SPEED IN ENGLAND.**—It is stated that railway trains in England are now driven at an average speed, which is 14 per cent higher than it was 20 years ago, with scarcely any more than half the quantity of coal.

## SCIENTIFIC PROGRESS.

## The Telephone an Old Idea.

It is said that the principle of the telephone has been known in India for 2000 years. Mr. Fred Amesbury of New York, who has just returned from a two years' sojourn in that country, says that the communication is confined entirely to the temples, the natives believing it to be the "governing spirit." The wire was some kind of metal, but neither steel, copper nor brass, although it closely resembled the latter. The transmitter was of wood, and about the size of the head of a flour-barrel, and to establish connection, instead of ringing a bell, the person wishing to attract attention at the other end stood close to the curious-looking thing and shouted: "Ooey! ooey! ooey!" The sound is faint, but distinct. The telephone which Mr. Amesbury describes has been in use 30 years, and he was shown worm-eaten transmitters and conduits that must have been 200 years old.

We are not told whether the wires then used were charged with electricity. Probably they were not—at least they could not have been until within the last 50 years. The principle of the telephone—minus the electric current—was used a hundred years ago in Mexico, and was a well-known parlor pastime in this country years before Bell thought of applying the electric current to it. Common strings, stretched from room to room in a straight line, held taut by knots at either end and fastened to the bottoms of two tin-cans, furnished the entire apparatus—the cans being used as transmitters and receivers. Conversation can be readily carried on by such a simple device for the distance of one, two and three hundred feet—depending upon the character of the strings used, the condition of the atmosphere, and the more or less perfect manner in which the device was put together. Wires were used for longer distances and more perfect work. The writer experimented and amused himself and friends with such an apparatus years before Bell made his invention. Mexican bandits had them strung across ravines and from hill to hill, to more readily communicate with each other in their nefarious business. The wonder is that some one did not utilize a well-known principle years before Bell thought of it.

## Colored Photography.

The persistent experiments of scientific photographers to produce photography in colors have resulted, of late, in some decided successes in that direction. The latest advance in this direction which has come under our notice has been made by Mr. J. E. Mayall, 164 Bond street, London. Mr. M. has been experimenting for many years, and has so far progressed in the details of his process that his color pictures are now reported as presenting beautiful specimens of this new departure in photographic art. Mr. Mayall, after 14 years of experimental research, has discovered the art of reproducing the colors latent in the negative of the photograph, having arrived at his discovery by the aid of spectrum analysis, which led him to the conclusion that every color in the organic world, when exposed to a suitable photographic plane in a camera, registers exact vibrations. He has succeeded in producing chemical colors extremely attenuated, which exactly correspond with the vibrations in the negative. In doing this he keeps the film alive to the smallest vibrations of light. He uses, firstly, lactate of iron to impregnate the isinglass film with a salt of iron capable of uniting with any stronger organic acid; and secondly, meconic acid, which impregnates the film of albumen, and has a stronger affinity for iron than lactic acid. It unites with the iron, and forms a red film, which is in a state to receive all the lower vibrations of the red end of the spectrum, and this gives these lower vibrations a fair chance with the electric light. All subsequent processes assist this chemical march to the final end of making a print that will take up colors, which, when added, fall in their places, and there remain indelible and unalterable. An inspection of Mr. Mayall's productions recently took place at his studio, one of the special features of which was an extended and perfected system of electric light, which consists of three 6000 to 10,000-candle power are lamps for photography by Mr. Mayall's new process. The reception-rooms, studios and entrances are fitted with 50 20-candle power glow lamps, the whole constituting an establishment well worthy of the new process which has been thus publicly inaugurated.

**PRESERVATION OF FLOWERS.**—A method of preserving the natural colors of flowers, recommended by R. Hegler in the *Deutsche Botanische*, consists in dusting salicylic acid on the plants as they lie in the press, and removing it again with a brush when the flowers are dry. Red colors in particular are well preserved by this agent. Another method of applying the same preventive is to use a solution of one part of salicylic acid in 14 of alcohol by means of blotting paper or cotton wool soaked in it and placed above and below the flowers. Powdered horacic acid yields nearly as good results. Dr. Schönlund, in a paragraph contributed to the *Gardeners' Chronicle*, recommends, as an im-

provement in the method of using sulphurous acid for preserving the color, that in the case of delicate flowers they might be placed loosely between sheets of vegetable parchment before immersion in the liquid, so as to preserve their natural form.

**GASEOUS EXPLOSION OF PLATINUM.**—The curious fact was some time ago brought to light, says *Nature*, by Nehrwald, that solid particles are ejected from a platinum wire glowing under the influence of an electric current, and form a metallic incrustation upon the walls of a glass tube by which the wire is surrounded. The cause of the emission of these solid particles of platinum has, however, until recently, remained a complete mystery. In the number of the *Annal der Physik und Chemie* just received will be found an interesting paper by Dr. Alfred Berliner, who, in the course of a series of experiments upon the occlusion of gases by platinum and palladium, has discovered the source of this singular phenomenon. Thin strips of platinum, before being charged with the gas under experiment, were inclosed in a narrow glass tube, and freed from all occluded gas by being heated to redness, *in vacuo*, by the passage of a constant electric current for several hours. At the expiration of this time the metallic incrustation was invariably found when occluded gas has been evolved. On charging the strips with various quantities of any particular gas, the amount of any incrustation formed after the complete expulsion of the gas in each experiment was found to vary in the same proportion. Hence it appears pretty clear that the evolution of gas is necessary for the emission of solid particles. This result is strongly confirmed by the fact that palladium, which has such a remarkable power of occluding gases, produces a similar incrustation much more readily and at a lower temperature. It appears probable that the action is merely mechanical, that we have, in fact, an immense number of microscopic volcanoes or solfatarae, evolving the occluded gases with such energy that portions of the crater walls are detached and carried away by main force, like their brethren on the large scale, the scorias and lapilli, to distances very considerable in comparison with the size of the vents.

**WHAT THE EAR CAN INDICATE.**—A well-trained ear is of great assistance whenever there is anything going wrong in the way of machinery, as there is always a slight discord somewhere that will quickly attract attention if the ear has been cultivated for it. The slightest squeak cannot be covered up by the heaviest clatter, and the least disturbance in the way of noise changes the tone of the racket very perceptibly after one becomes accustomed to the sound made by each piece of machinery. How quickly the ear will indicate whether the blows of the hammer are doing any work or not. It is used in testing car-wheels and has been carried so far by boiler-makers as to point out the places where their boiler iron has crystallized. The woodworker can tell by the sound of a few blows where floor joists are to be found beneath the floor, and would never think of driving a nail in the wall without sounding for a solid bearing. There is no need of driving for a long while on a shaft to see if the gear-wheel is going to start, as the sounds speak in plain language that it is "no go," and the same thing holds good in driving parts of machines in place. A grating sound ought to indicate there is grit somewhere, but we have seen nicely fitted work put up and set to running without any notice of anything wrong in this respect, when each separate grain of grit could be distinguished by a careful ear. The man at the forge can tell quite accurately by the tremble of the tongs when a tool he is trying to harden has cooled one-half way through that he may use the heat in the remaining portions for drawing the tool to a temper.—*Ec.*

**MAGNETISM IN METALS.**—"Mr. Shelford Bidwell (Royal Society, March 1st) is continuing his admirable researches in the changes produced by magnetism in the lineal dimensions of the different magnetic metals," says *Nature*. "He finds that iron, which first expands with the magnetizing force, soon reaches a maximum point, whence it contracts until it attains its original length; but, on still further increasing the magnetizing force, it contracts until it apparently reaches a minimum point, beyond which his means have not enabled him to proceed. Bismuth appears to continually expand, nickel to continually contract; while cobalt contracts, reaches a minimum point, and then expands, approaching its original length. Manganese steel was unaffected. His apparatus was so perfect and sensitive that he could read a variation of one hundred-thousandth of a millimeter."

**HIGH WATER PERIODS IN THE MISSISSIPPI VALLEY.**—Some one has discovered that high water periods come and go in cycles of seven years in the Mississippi valley. It was in 1881 that there was the last high water in the Mississippi, and log-owners were apprehensive that some of the logs stored in booms north of Minneapolis could not be taken out. But the high water came at the period of seven years after the next previous high water. This year is another high water period, and it is confidently expected that the spring freshets will prove unusually heavy from the melting of the snows which have fallen the past winter in such unusual quantity, and have lingered so long in the lap of spring.



## GOOD HEALTH.

## Disinfecting Consumptives.

A new method of treating pulmonary consumption is described by the *Medical Record* from French sources. Sulphureted hydrogen was one of the alleged curative agents in the Bergeon treatment by gaseous enemas. The French experimenters have discarded that method as one of doubtful utility, but they seem determined to fill their patients' lungs with sulphur in some form. Their new system of curing consumption is based upon sulphuric acid in mediated inhalations. Sulphur slightly moistened with alcohol is burned in a brazier, a little benzoin or powdered opium being sometimes added to make the fumes less disagreeable. The patient is required to stand twice a day in this sulphurous chamber and inhale the medicated atmosphere until his lungs are saturated with sulphuric acid. The treatment is said to have been markedly successful in as many as 30 cases, awats and fever disappearing, the lungs clearing up and the appetite and weight steadily improving. M. Dujardin-Beaumez, who has been favorably impressed with the reports made in these cases, has tested the method practically, and greatly benefited, if not cured outright, seven patients. Into his sulphurous chamber fresh air is admitted from time to time, the patients being more mercifully dealt with than in the original experimenting-room.

This method of treatment is said to have been suggested by the experience of a soldier in the last stages of consumption. He was employed in disinfecting barracks and was obliged to pass nine hours a day in a sulphurous atmosphere. Although his condition had been pronounced hopeless by hospital authorities, he completely regained his health in 65 days. The sulphur burned for the purpose of destroying the germs of contagious disease in the infected barracks had a similar effect upon the tubercle bacilli of his own lungs. This is the practical explanation which the scientific followers of Dr. Koch offer of the success of this singular method of treating phthisis.

**FLORADOR.**—This is the name given to a new food prepared from the best products of selected wheat. It claims to be a chemically perfect food, possessing all the constituents necessary to nourish the human body. As a nutrient, wheat, it is well known, takes much higher rank in the hierarchy of cereals than sago, rice, maize, or corn flour and tapioca. These are simply starches or fat-formers, while wheat possesses a great percentage of flesh-forming constituents. All these are retained in florador, which is prepared from the best wheat by a new process, and by special machinery designed to ensure the retention of the delicious aroma of wheat as well as its nutritive qualities. It possesses also the important quality of being easily digested, which, to a large class of persons, and to invalids, will alone ensure for it a hearty welcome. Even when cooked without milk or eggs it is light and palatable, making delicious porridge. It is made in three grades or sizes, large grained, medium and fine. The first is well suited for porridge, and as a substitute for macaroni or vermicelli in soup; the second will, to a large extent, take the place of flour for making hoiled puddings and for baking an especially wholesome bread; and the third, or fine grained, is most suitable for blancmange and similar preparations in molds, and for cakes, biscuits, and fancy bread. The new food is put up in elegantly labeled packets and tins; and in view of the special advantages which it possesses over other and similar foods now in the market, there appears to be little room to doubt that it will be a great and signal success among the novelties of the year. It is manufactured by the Florador Food Co., Glasgow, and 11 Southampton street, London.—*British Trade Journal*.

**THE BODY AT CLOSE OF WINTER.**—A medical view of the month of March is given by a physician in the *American Magazine*. He says: "Never does lettuce or spinach or a new potato taste so delicious as during this month, while yet winter holds in strong grip the shivering days and gives a vicious kick whenever he gets a chance. Never is such food more needed; for our blood is heavy with a debris, the acids of restrained excretion. Shut by triple bars of cold, skin emunctories—microscopic sweat-tubes—no longer perform their office freely; only insensate perspiration can pass, itself too often clogging up the means of escape when regular bathing has been neglected."

**SCARLET FEVER GERM.**—Patient and long-continued experiment and observation by the distinguished physician, Dr. Klein, seem to have thoroughly demonstrated that scarlet fever is induced by a germ, or microbe, micrococcus scarlatine, which is formed in the milk of cows affected by a certain disease. The same microbe is obtained from the disease cow, from her milk and from patients suffering from scarlet fever. Fortunately the infectious property of the milk can be destroyed by heating it to 185° Fah. This precaution should never be neglected when scarlet fever is prevalent.

**THE USE OF BEER.**—In many minds there is a mistaken notion in relation to the effect of beer on the human system. Because those who use it largely often become fleshy, and appar-

ently healthy, the conclusion is reached that it is a wholesome. The *Scientific American*, a high authority, thus expresses itself in relation to the matter: "For some years a decided inclination has been apparent all over the country to give up the use of whisky and other strong alcohols, using as a substitute beer and other compounds. This is evidently based on the idea that beer is not harmful, and contains a large amount of nutriment; also that bitters may have some medical quality which will neutralize the alcohol which it contains. These theories are without confirmation in observation of physicians. The use of beer is found to produce a sort of degeneration of all the organs; profound and deceptive fatty deposits, diminished circulation, conditions of congestion and perversion of functional activities, local inflammation of both the liver and kidneys being constantly present. Intellectually a stupor amounting almost to a paralysis arrests the reason, changing the highest faculties into a mere animalism, sensual, selfish, sluggish, varied only by paroxysms of anger that are senseless and brutal. It is our observation that beer-drinking in this country produces the very lowest kind of inebriety, closely allied to criminal insanity. The most dangerous class of ruffians in our city are beer-drinkers."

**HOW FINGER NAILS GROW.**—The growth of the nails is more rapid in children than in adults and slowest in the aged. It goes on more rapidly in summer than in winter, so that the same nail that is renewed in 132 days in winter requires only 116 in summer. The increase for the nails of the right hand is more rapid than for the left; it also differs for the different fingers and in order corresponding with the length of the finger. It is most rapid for the middle finger, nearly equal for two either side, slower for the little finger and slower for the thumb.

**NASAL TUMORS.**—Apyrexia is the name Dr. Guye of Amsterdam chooses for inattentiveness, and he quite singularly finds that the nose is the cause of it. A dull boy became quick to learn after certain tumors had been taken from the nose, and a man who had been troubled with vertigo and buzzing in the ears for 12 years found mental labor easy after a like operation. In a third case a medical student was similarly relieved. Dr. Guye supposes that these nasal troubles affect the brain by preventing the cerebral lymph from circulating freely.

## USEFUL INFORMATION.

## Wood Pulp for Building.

An important discovery has just been made at the Sognedal Pulp Factory in Norway, after several years' experimenting, wood pulp being used for the manufacture of the kinds of building ornaments which are generally made of plaster-of-paris. The pulp is first ground from wood, and then, by a machine, pressed into any kind of an ornament, such as ceilings, bas-reliefs, rosettes, etc., which are quite as well finished as similar articles in plaster-of-paris. Another feature is that the articles made from the pulp show painting or gilding to great advantage. Tests have also been made with regard to their strength, by dropping them from various heights or hurling them against stone walls, the results being highly satisfactory. Thus, for instance, a bar of this material one foot in length, one inch in thickness and five inches in width neither broke nor sustained any serious injury on being hurled with full force against a stone wall a couple of yards distant. Naturally, too, this material is far lighter than plaster-of-paris—an important advantage, as no great harm would be caused to a person by ornaments made from it falling upon him, which is otherwise with those made from plaster-of-paris. It should also be mentioned that pulp ceilings, friezes, etc., are, by the hardness and compactness of the material, impervious to wet, and that they may, if desired, be fastened by nails or screws. Finally, the inventors state that ornaments made from this material cost only half the price of similar ones made from plaster-of-paris. This discovery will, it is believed, give great impetus to the pulp factories of Scandinavia, which are now almost unprofitable through the lower prices of paper prevailing abroad, and the utter failures which have attended the vast production of the latter, direct from wood pulp, by a firm in London.

**MILLING VS. PLANING METALS.**—There seems to be some considerable controversy among mechanics in regard to the comparative merits of milling and planing machines. A correspondent of the *American Machinist* is alluding to some adverse comments on the use of the milling machine, says: "You are probably aware that I am a strong advocate of the milling cutter for all machine-shop work, where it is possible to use it; and I had an idea that most of our master machinists had a similar liking for this tool. There is a well-known company in the Eastern States who have been using 16 planers for the past 20 years, and are now about to adopt the heavy milling machine system in place of the planer. In other words, there will be but three or four planers in their establishment, the others being replaced by seven special milling machines. This plan was

decided upon after many comparative trials of the two systems, working in both wrought and cast iron. I think there must be something wrong about Mr. Johnson's experience with milling machines, and this may not be his fault; for if the machines used by him were not designed with a rigid structure, then failure was the most natural result." Mr. Conradson strikes the nail on the head when he says, "The chief reason, in my opinion, that the milling machine is not used more extensively is this—the proper machine has not been put on the market. The average milling machine has a spindle much too small; the table is too shallow; the bed is weak; the driving-power fails on heavy cuts, and the feed is a complete failure."

**FILLING CRACKS AND WORM HOLES.**—A correspondent of the *London Mechanic* recommends sawdust or raspings of hard and soft wood for filling the cracks and worm holes in old furniture, which he says he learned from Oriental carpenters. The sawdust is sifted through wire gauze, and each kind kept by itself. He says: "For a crack, a worm-eaten hole or a deep flaw prepare the proper dust by the admixture of brick-dust in flour (also kept ready), or whitening, or ochre, or any required tint. Then take well-cooked glue, and, on a bonse plate, stir it in slowly while hot with sufficient powder for your work. Dip the hole or crack with your glue brush, then with a putty-knife stir about the mixture on the plate, taking care you have the right color. When sure on this point, take some of the cement on the end of the knife and insert it in the desired place. Then use as much pressure as you possibly can with the blade, and keep smoothing it in. Sprinkle a little of the dry powder on the spot. When thoroughly dry, sandpaper the surface with an old piece, so as not to abrade the joint. You can then varnish the mending. Where weevil and woodworms have devoured the furniture, cautiously cut out the part till a sound place be reached. Poison the wood with a solution of sulphate of copper injected into the hollow. Let it dry. Cut an angular piece of the same wood from your board, and with a sharp chisel make a suitable aperture for its reception. Fix it with glue. When thoroughly dry, work with carving-tools or rasp and glass, scraping until the new bit of work exactly matches the old."

**WAXING HARDWOOD FLOORS.**—Take a pound of the best beeswax, cut it up into very small pieces, and let it thoroughly dissolve in three pints of turpentine, stirring occasionally if necessary. The mixture should be only a trifle thicker than the clear turpentine. Apply it with a rag to the surface of the floor, which should be smooth and perfectly clean. This is the difficult part of the work, for if you put on either too much or too little a good polish will be impossible. The right amount varies, less being required for hard, close-grained wood, and more if the wood is soft and open-grained. Even professional "waxers" are sometimes obliged to experiment, and novices should always try a square foot or two first. Put on what you think will be enough, and leave the place untouched and unstepped on for 24 hours, or longer if needful. When it is thoroughly dry, rub it with a hard brush until it shines. If it polishes well, repeat the process over the entire floor. If it does not, remove the wax with fine sandpaper and try again, using more or less than before, as may be necessary, and continue your experimenting until you secure the desired result. If the mixture is slow in drying, add a little of the common "driers" sold by paint-dealers, Japan for instance, in proportion of one part of the drier to six parts of turpentine. When the floor is a large one, you may vary the tedious work of polishing by strapping a brush to each foot and skating over it.—*Scientific American*.

**BASSWOOD** may be enormously compressed, after which it may be steamed and expanded to its original volume. Advantage has been taken of this principle in the manufacture of certain kinds of moldings. The portions of the wood to be left in relief are first compressed or pushed down by suitable dies below the general level of the board, then the board is planed down to a level surface, and afterward steamed. The compressed portions of the board are expanded by the steam so that they stand out in relief.

**TRADES IN HIGH LIFE.**—The late M. Carnot, father of the President of France, had two sons, both of whom, in view of the great uncertainty of conditions of life in that country, were taught trades, by which, in case of emergency, they might earn a living. The younger brother learned the locksmith's trade; the one now President of the French Republic is a carpenter.

A NEW lubricant, the use of which is advocated in the *Austrian Railroad Journal*, is mustard oil. It remains perfectly fluid at the low temperature of 14° F., and will keep unchanged for years.

**EMBOSSED WALL PAPER**, having all the appearance of carved work, is now being introduced in England. It is not produced by stamps, but by the imposing of flock-designs on surfaces.

**POLISH** bright iron work with rotten-stone and oil, if it is running machinery.

**FILES** were in use among artisans as early as 1093 B. C.

## The Pines of Japan.

Their Quaintness and Significance when Potted and Ancient.

Carter H. Harrison, but so short a time ago Chicago's "best mayor," is in Japan, and is writing a series of highly interesting letters to the *Chicago Mail*. In his last he mentions the pine of Japan. "But when he sees here an old pine tree with gnarled and bent branches, its whole appearance the exact counterpart of the ancient monarch of the mountain-side—when he sees this old-looking, perfectly healthy, and thrifty fir, 100, 200, and some 300 and 400 years old, growing in a flower pot 4 feet long, 2 wide and not 2 feet deep, he hardly knows whether to be most interested in the skill evinced, or amused by the grotesqueness of the idea which suggested the thing. Such a tree I have seen. Its whole height was not over five feet and its gnarled branches did not cover an area of eight feet. I asked its age and was answered 450 years. Near by were dozens of smaller ones in pottery vases, perfect in form—some round and bright as the denizen of rich bottom land, others queer looking, odd old lilliputians that made one think he was visiting an old ancestor of centuries ago, hanging from a rocky crag; that he was looking at it through the reversed lens of a powerful field glass. I ask: 'How old is that?' 'It was planted by my father 52 years ago.' 'And that?' 'My grandfather put it in the pot 70 years ago.' 'And this other here that looks as if it had been watered with the first water of old Noah's tank?' 'Ah, that is a beauty—and the pride of my garden. It was transplanted when no taller than my little finger by my great, great, great grandfather nearly 200 years ago. He spat upon its roots. He is a good god now, and his soul sits among its branches every day and blesses his children.' And the good man folded his hands and looked as if he felt that the spirit of his ancestor, now one of his household gods, heard his pious words.

"These old trees are in gardens and adorn the niches for ornaments in the houses of the well-to-do. They are grown on either side of the central incense burners before the inner temples—the holy of holies—where abide the living souls of the gods in the great temples, both Shintoo and Buddhist. One looks upon them very much as you do when you look into the weak eyes of a baby elephant, so cute, so quaint, so knowing, and so like its monster mother when it stretches forth its flexible trunk to take a peanut from your hand. Then, too, there are monster trees—they claim them to be 1000, or nearly 1000 years old, whose branches have been trained into every conceivable abnormal shape, and are venerated, if not absolutely worshipped.

"We visited one on Lake Biwabi or Biwabo. It is about six feet in diameter just above the spread of the roots, but a little higher up where its three great branches spring out, 13 feet in diameter. At some 20 feet altitude, the many limbs coming out of the three great branches have been trained horizontally, and cover a space of nearly 180 feet from cut to cut. One branch, up to a few years since, lifted to a height of 90 odd feet. A typhoon took it off. The broken place is cemented over and a little house is perched over it. A small temple lies in its shade, and the soul of a god lives and sings among its needles. The attendant first told me it was 1000 years old—I believed him—why should I doubt? Thomas doubted. I never do, especially now that I travel for rest and wish to live in a half dream.

**BEING POSTED.**—Somebody says: If a man truly desires to know how deeply he is posted on any subject, let him write an article upon it. If he goes at the matter considering the world his audience, and writes nothing but what he feels will stand against all criticisms if brought to argument, he will be a much wiser man at the close of his article than when he commenced. I can truly say my writing has done me personally more good in understanding the true principles of our trade than if I had had a hundred lives' work in the manner generally practiced. The good derived from writing is obtained simply from the fact of making one study and originate. Writing upon any subject is the best way to study it.

**CYPRESS WOOD.**—It is demonstrated by actual experiment that cypress is admirably adapted to the building from top to bottom, inside and outside. It is a wood that stays where it is put, makes close joints, finishes handsomely, and works as well in every respect as white pine, though perhaps not quite as easily. For siding, cypress should be selected so that there shall not be rough spots in the grain. A careful throwing out of the rougher pieces will obviate a bad appearance that might be caused by a careless carpenter.

The erection of a quartz mill at Orona, Nev., to work the Trinity mines is now an assured fact. The graders are at work and some of the machinery on the ground. In a short time reduction works will also be built in Cottonwood, and work is being prosecuted on the several prospects at Rye Patch along the mountains to the Silver Bell.

**EMIGRANT GAP** will be a lively camp this summer, as several mills that have been idle for many years will start this season. Friend & Terry will employ a hundred men. George Geisendorfer begins operations about the first of May with quite a large force.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**MINES BONDED.**—*Ledger*, May 5: H. P. Holland and J. W. Stewart of San Francisco have bonded the Crown Point quartz mine, located near Butte City, in Jackson mining district, for the sum of \$25,000, payable on or before March 5, 1897. This property is owned by D. D. Matson, M. S. Matson and J. W. Brown. The same parties have also bonded the Brown mine, located near Butte City, for the sum of \$45,000, payable on or before Jan. 1, 1889. This quartz claim is now owned by M. S. Matson, D. D. Matson, J. W. Brown, Matthew Fleming and L. K. Hall. The persons who have bonded these claims are interested in the New York and other claims, about 2½ miles southwest of Jackson.

**MISCELLANEOUS.**—They have finished crushing the ore on the dump at the Moore mill and are now engaged in cleaning up. About 200 tons were passed through the mill, occupying two weeks. The ore was undoubtedly low grade, being mixed with a great deal of greenstone and refuse matter, but it is thought the yield will be sufficient to leave a fair profit over milling expenses. The shaft of the North Star has reached a depth of 500 feet; no change to speak of in the nature of formation. It is reported that the Amador Queen mine has been bonded with a view to place the stock on the New York market. James Gleason and a gentleman named Callan of San Francisco were in Jackson last week, for the purpose of securing a bond for one year of the Doyle mine in Hunt's gulch. They left Sunday morning after making satisfactory arrangements to bond the property.

#### Butte.

**IMMENSE ELECTRIC PLANT.**—*Oroville Register*, May 3: The electric machinery for the Big Bend Tunnel Co. is now at the depot. It comprises 2 dynamos, 12 motors, 50,000 pounds of copper wire and a large lot of different kinds of machinery. The dynamos have a capacity of 140-horse power, and the motors five-horse power each. There are two lines of copper wire, one of seven miles and the other of ten, and as each is double, this makes about 34 miles of wire. The electric power will be used to run the pumps and derricks. The plant was furnished by the Sprague Electric Railway & Motor Co. of New York. A force of men is now engaged in getting everything ready for this immense plant. Three hundred inches of water with a fall of 300 feet will furnish the necessary power to run the dynamos.

#### Calaveras.

**THE UNION AND RATHGEB MINES.**—*Prospect*, May 2: Last Sunday our reporter visited the Union gold mine and Rathgeb's new mine. There is not a large force of men employed at the Union mine. The shaft is being sunk as rapidly as possible and a few men are kept at work in the upper levels taking out some quartz and looking for pockets. In the afternoon we visited the Rathgeb mine, about one mile south of the Union gold mine. The Rathgeb Bros. have expended considerable money in improvements in and about the mine. Hoisting works have been erected under the supervision of Mr. Buckingham, which for strength and durability cannot be excelled in the county. The main shaft is down about 100 feet and has three compartments and well timbered. The boiler is a very large one and capable of furnishing steam for a 20-stamp mill in addition to running the pumps of the mine and engine. Everything is in readiness with the exception of a few days work in connecting the water and steam pipes with the engine and boiler. The hoisting engine is a double-crank reversible engine and about 40-horse power. Mr. John Rathgeb informed us that he intends to build a mill alongside of the hoisting works during the coming summer. There is already a large quantity of good pay rock on the dump, and by the time they will be prepared to crush the ore several hundred tons more can be piled up.

**WEST END.**—*Angels Echo*, May 2: The West End mine, owned by Smyth & Co., situated about a mile west of Angels, is making an excellent showing. Last Monday a blast in the new shaft disclosed a fine body of ore, which is rich in sulphurets and shows a good quantity of free gold. This mine has a very promising outlook.

**LEONARD.**—*Calaveras Prospect*, May 2: The Leonard quartz mine is improving in appearance every day. A large body of sulphurets was found last week that surpassed anything ever seen in this county heretofore, both in appearance and richness.

**HEX.**—An abundance of water was struck in the Hex mine at Rich gulch on Tuesday, and several men had to quit work. The company have telegraphed for several large pumps, which will be set to work as soon as they can be got in position.

**COPPER.**—About 50 men are employed in the copper mines at Copperopolis, and as soon as some new machinery is put on an additional force of from 100 to 150 hands will be employed. This is encouraging for the little town of Copperopolis.

**ESMERALDA.**—Several new hands have been put to work on the Esmeralda mine and the indications are that the mine will be opened up in good shape ere long.

#### Nevada.

**A SLEEPY CONDITION OF AFFAIRS.**—*Herald*, May 3: There has been a lull in everything hereabouts for several months. Everything seems to be in a rut. Such times often occur among miners. Mining is more or less governed by excitement. If one man strikes it, all become hopeful and all go to work. Mine-owners have confidence in their properties, but are waiting. All it needs to start business up in this section is for some one to go to work. The mines, and the prospects that will make mines, are here. There ought to be 300 more men at work in this district to-day. The mining world is asleep. Business men in town are a little sleepy, too. We suppose a majority of the business men here do not get out of the city limits once in a year. A walking party might be organized with profit. Men become indifferent to the advantages surrounding them. A look on the outside would do such men good. The surroundings all invite enterprise. There is a lull, a suspicious calm all over the county. It may

be spring fever. Go to our neighboring town, Grass Valley, and you have to ring the bell to wake up the proprietors of business houses and hotels. The residents have to come to Nevada City to get their eyes open. Nevada county is not awake. Even the Land Association has nothing to say these days. Mining will start up when people wake up. The gold lies underground waiting for the nimble pick to unearth it. Confidence begets confidence. Talk mines if you can't work mines. Wake up.

**MOORE'S FLAT.**—*Nevada Transcript*, May 6: The mining population are now engaged in profitable drift and quartz mining. At Snow Point, George Coppers, while washing the surface near his ledge, in order to find its direction, cleaned up \$225 as the result of three days' work. This claim is in New York Ravine, two miles distant. Blackwell & Kline at the same place recently took out gravel from their claim that paid \$5 to the car, and are doing well right along. McKillican's gravel mine is working a force of 15 men, and the prospects are favorable for a good paying mine. The old Boston mine is now being opened up under the superintendency of H. H. Brigham. George Abrams, "Happy George," our almost lifelong prospector, has renewed work on the Metropolitan. L. F. Busch, who owns the extension of the Metropolitan, has about ten feet to run before striking the ledge. Thomas Dowling is pushing ahead his drift tunnel in the Illinois to uncover the channel at a point where it is supposed to have narrowed. The Plumbago Extension is looking well, as usual.

**EVENING STAR MINE.**—*Grass Valley Union*, May 5: A first crushing of ore from the Evening Star mine has just been made at Gauthier's mill, the amount being 41½ tons, which gave a yield of \$486.88 retorted gold, or within a fraction of \$12 per ton. This was independent of the sulphurets, of which there were over 1100 pounds. There was some waste in the rock that was crushed, which made the yield somewhat less than it otherwise would have been. The result, however, was quite satisfactory, and as there is plenty of ore of the same quality, in the drift on the level that is being run at the depth of 108 feet, the future crushings are expected to do equally as well, if not better. The vein in the Evening Star is over two feet in width, and the ore shows in free gold and good sulphurets. The company is preparing to put up hoisting and pumping works, when the work of development will go on more rapidly.

**THE NEVADA COUNTY MINE.**—*Herald*, May 4: The owners of the Nevada County are greatly encouraged with the prospects in their drift to-day. Rich rock was found in three stringers which came in this morning, and lead to the belief that they will, in a short distance, unite and make a solid ledge. It is believed the point where this rock is found is near what is known as the Italian Shoot, which was worked 20 odd years ago, and from which rock was worked that milled \$150 per ton. The owners of the Nevada County are persistent and deserve to strike it rich. A few more men like them in the community would help to open up some of the many good prospects hereabouts. The owners of the Nevada County mine are several degrees removed from the millionaire level, but they spend their coin liberally, and will, we hope, get returns, eventually, that will amply repay them.

**SATISFACTORY CRUSHING.**—*Tidings*, May 3: The first crushing of ore from the Evening Star mine, situated on Squirrel creek, has been completed at Gauthier's mill. Forty-one and a half tons were reduced, yielding at the rate of \$18 a ton. This rock was taken from a ledge averaging 3½ feet in thickness and from a depth of about 100 feet. Not a little waste dirt was mixed with this ore. This showing is regarded as satisfactory and as warranting further developments, to prosecute which to any extent a hoisting and pumping plant must be erected. The Evening Star is managed by W. B. McSherry and is owned by San Franciscans. It adjoins the Pittsburg, recently relocated by C. E. Clinch and others, and which is to be operated.

**THE EARTHQUAKE FLOODS A MINE.**—*Grass Valley Tidings*, May 2: Up to the hour of the earthquake of Saturday night, the water in the Orleans mine at Prescott Hill was easily kept "in fork" with the pump running slowly. Saturday night the pump was run as usual, but when the men went down the shaft Sunday morning, it was found that the water had risen the lower level. Since then the pump has been kept going at full speed, and yet the water has not been reduced. The supposition—and no doubt a correct one—is that the earthquake opened a seam in the earth from the shaft to a subterranean reservoir.

**MINING AT MONTEZUMA HILL.**—*Nevada City Herald*, May 3: Irvin Hiseock, Stephen Murphy, Fremont Woods and Joseph Keifer have opened a good drift gravel mine at Montezuma Hill, this county, called the Murphy mine. The mine is easily worked and pays well, although the owners have not yet reached the bedrock. They are about starting a new tunnel which will give them 10 feet more back. There are other claims on the same lead, near by, which are supposed to be equally as good.

**LONE JACK MINE.**—*Grass Valley Union*, May 6: George Mainbart is just now about the busiest man in town. Mr. Mainbart is the superintendent of the mining business inaugurated by San Francisco, Sacramento and Eastern people, for the purpose of developing the Lone Jack mine and several claims adjoining. The new shaft on the Lone Jack is now down 100 feet, the shaft being timbered to its fullest depth. Every encouragement is given by appearances for a paying mine.

#### Placer.

**FOREST HILL DIVIDE.**—*Placer Herald*, May 5: The town feels and shows the effects of the mining operations that are conducted in its vicinity. The most important mine is the Mayflower, which has given employment to a large number of men for several years. The gravel is very rich, but owing to the great expense of hoisting it, the company concluded to run a tunnel. The necessary survey was made, and the tunnel was begun in the fall of 1886, and during the following 18 months it was run 5200 feet; and during the last eight months of this period 2800 feet were excavated. This is a great work, considering the difficulties under which it was done, and cost \$104,000. Such was the accuracy of the survey and the skill of the workmen that when the connection was made there was not the least deviation. One can stand at the farther extremity and see the entrance. The tunnel for the last 500 feet

is 10 feet wide and seven feet high. About 60 inches of clear water are constantly flowing from the tunnel. The works of the company are extensive and costly, and embrace the most improved machinery. There are two compressors for working the Burleigh drills, the hand drills and the bellows of the forges. These compressors are run by steam and by water-power. The new mill is about half completed, and is located below the tunnel's mouth. At the time of writing work is suspended, owing to the sale of the mine. The company have received a forfeit of \$20,000, and expect to receive the remainder, \$520,000, in 60 days. The Baker Divide tunnel is about 4000 feet in length and crosses the ridge. The company expect to intersect the Mayflower channel. Ten men are at work in the tunnel and several more are employed on the surface. A large force of men is at work at the Dardanelles, building a mill, cleaning ditch and getting out timbers. The mill will be ready to crush in two weeks. The gravel is quite hard, but is very rich—paying \$11 per carload. At the Gray Eagle mine work is progressing as fast as circumstances will allow. At present, work in the shaft is at a standstill, as a third boiler is being put in place. This is necessary, as a large quantity of water has been tapped. The indications are better than they were a week ago. At Yankee Jim's only a few men are operating. Charles Trafton is running a tunnel into Georgia Hill and expects to strike a rich lead and a deep channel. O. W. Henderson is working the old Davis claim; he has not made a cleanup as yet. Harry Adams is cleaning out his tailings claim in Brushy canyon. The Gilberts and J. Welker are opening drift mines on the north side of Georgia Hill. Breece & Wheeler are working 27 men on the Paragon ground. Their tunnel is in 7000 feet, and is running through uneven rock. The gravel is of good depth and very rich—averaging \$10 to the carload. They now run out gravel enough to keep the mill constantly crushing. The head of the tunnel, is now under Mayflower ravine. Operations at the Live Oak mine are going on night and day. Quite a large force of men is engaged at the mill and in the tunnel which is now in a reddish gravel that will pay well. The gravel is taken out near the front of the claim. Just now they are not running the tunnel ahead, but are breasting across the channel, which is 300 feet wide. The mill is a substantial structure and is run by water from the Mayflower tunnel. The Big Gun mine is the only claim near Michigan Bluff that is being worked at present. This old mine continues to pay about the same as it has for the last 20 years. T. Muir has a few men at work at the Weske and Oro claims. The Hidden Treasure keeps up its record in paying big dividends. The tunnel has been put in complete working order. One hundred carloads, or 400 tons of gravel, are taken out daily. The cars are drawn out and in by horse-power. The company employs 140 men. Tillotson & Co. have very good indications in the Golden Rifle, above Canada Hill. They believe they have struck the main channel. Some 25 men are at work on the Hogsback. The Red Point mine is yielding \$1.80 per carload. On the river, Boston Bar is paying well. Very little work is going on at the Horseshoe tunnel on account of a broken shaft. The tunnel clears itself—even logs and trees are carried through. Everything points to a lively season this summer all over the divide. Prospecting is going on in all directions. This work is being done principally by companies with ample means, and it is safe to infer that work will be continued until the secret treasures of this section are discovered.

**STRIKE.**—*Placer Republican*, May 2: After three years of hard labor on their gravel claim in Green Valley, Henry Keller and Chris. Helenkamp have at last made a good strike, and last week were taking out gold at the rate of \$25 a day.

#### San Benito.

**A VALUABLE PROPERTY.**—*Advance*, May 4: Few of our people are familiar with a mining industry being carried on close at home. The mines of the Gypsy Mining Co. are situated about 15 miles east of Hollister, and are owned by the Woody Bros. and Griffith & Dalzell. For the past two years an average of \$600 worth of quicksilver has been produced and shipped every month. Up to the present time but one small retort has been worked. L. R. Young has just completed the erection of a second and larger retort, which will greatly increase the production of the precious metal. Ten men are now employed, and more are wanted. The ore body is apparently inexhaustible, and ore taken from the surface is very rich in mercury. With the new appliances, the owners of the mine expect to take out \$10,000 worth of metal from the present time to the first of next January. The mines are splendidly situated for fuel, as they are surrounded by timber. Some of the specimens of ore taken from the tunnels show 60 per cent of metal. The mines are being rapidly developed, and will soon be a source of great wealth to the owners.

#### Shasta.

**A RICH CAMP.**—*Shasta Co. Democrat*, May 3: The *Democrat* has been a special champion of mining interests of old Shasta, firmly believing in the permanency and value of her mines, and it is more than a pleasant task to notice the development of mining property that from the beginning of developments shows permanency and value. The new mining camp on Cline gulch, in French gulch district, merits special notice in these columns. The first discovery was made by Mr. Frank Wheeler, last August. Inside of three months his claim developed sufficiently to warrant him in erecting a five-stamp milling plant, and from the first turn of the machinery the mine has paid handsome dividends, averaging over \$8000 a month net. His discovery led to others, on the same belt, and about a month following, J. N. Vannoy located adjoining the Wheeler on the east, and a week or so later Tom Cummings, Chas. Osborne and John Morrell located three claims adjoining Vannoy, still farther east, known as the Helena, Gladstone and Giant. This belt is a distinct continuation of the famous Deadwood mines eastward as far as Squaw creek, a fact positively proven by discoveries old and new. All these claims on Cline gulch show well-defined contact between slate and porphyry, and have every indication of permanency; in fact, they are a counterpart of the McDonald and Black Bear mines of Deadwood. The Helena is opened up by an open cut along the ledge, exposing ore that will mill \$60 a ton. On the Gladstone is a crosscut tunnel 60 feet, and a winze down 30 feet, from which has been extracted 200 tons of ore that will mill \$25 a ton, and

another tunnel just started that will tap the vein about 200 feet deep. An open cut has been started on the Giant, which exposes a vein seven feet wide, the ore showing much free gold. On these claims is a fine water privilege and plenty of mining timbers. As far as developments show this vein averages four feet in width the entire length of these three claims. We don't believe there is a new camp on the coast that can show, according to stages of development, better prospects for permanency and value.

**NOTES.**—*Shasta Co. Democrat*, May 3: Tom Green last week struck a new, large and rich chute of ore in his mine. The Calumet Mining Co. is patenting its mines in Old Diggings. We are told that Colorado capitalists are negotiating for the purchase of the Black Bear mine on Squaw creek. Experts have just spent a week examining the Windy camp group of mines and gone below to report, so we are informed. Flanagan, Forbes & Co. are reopening the old Florida on Star gulch, Old Diggings district, and are preparing to crush ore in a cannon-ball mill. White & Parsons, Arizona men, have bonded the Quartz Hill mine, and intend to run tunnels and crosscuts through that immense body of quartz. The Wheeler mine, on Cline gulch, is yielding handsome monthly dividends. Two claims adjoining this mine on the east are prospecting big, and present developments warrant the belief that they are valuable prospects. Bill Murray, John Finley, Dave Forbes and Col. A. C. Ellis have "struck it rich" on Clear creek, nearly opposite the Squaw creek mines. In the past month the boys have taken out over \$3000. They are sinking on a vein of yellow ochre ore, and take out from \$50 to \$250 a day. They mill their ore in a large mortar. F. H. Deakin is sinking a well on his premises at Lina Vista, and is down 130 feet in blue gravel, which prospects from 10 to 50 cents to the pan.

#### Sierra.

**THE ALASKA MINE.**—*North San Juan Times*, May 5: News comes from Pike City to the effect that Mr. Judson, assistant superintendent and book-keeper at the mine, left Pike City Friday of last week and went to the Bay City, via Marysville. It is generally believed that the mine will be abandoned to its creditors. For nearly a month past there has been no labor employed at the mine, except merely sufficient to run the pumps. The creditors are loath to take the plant, because of their inability to work it. It is said the indebtedness of the Alaska Co. is something over \$100,000, from \$50,000 to \$60,000 of which is due and owing to the toilers or delvers. There are filed in the recorder's office \$50,000 worth of liens against the property of the company. Colonel Bates, the superintendent, has not been to the mine for about two months past. He is in San Francisco. It is generally believed that the mine has gone up "where the woodbine twineeth," and unless the creditors take it, it will be allowed to fill up with water.

**NEW PROSPECT.**—*Sierra County Tribune*, May 5: Last week Martin Carroll while strolling over the hill just back of Devine's ranch, stumbled on to a quartz ledge that, judging from the prospects, will turn out to be a regular bonanza. He has two men sinking upon it and as depth is gained it continues promising. It is called the Pacific.

**CLEANUP.**—*Mountain Messenger*, May 5: The Young America mine cleanup for the month of April was about \$12,500. Owing to the scarcity of water, the mill did not run all the month.

**DIVIDEND.**—*The Gold Canyon Quartz Mining Co.*, operating below Minnesota, in this county, declared a dividend of five cents a share on a capital stock of 200,000 shares.

#### Tuolumne.

**MILL.**—*Union Democrat*, May 5: It is reported that Dick Ritchie's mill at Tuttleton is doing good work, and that the mine is turning out well. The Green mine, four miles northeast of Confidence, has a force of 15 men at work, and the mill will be started now in a short time. Under the supervision of Supt. Sharwood of the Black Oak mine, a big force of men is at work putting up new hoisting works and laying the long stretch of pipe for water-power, which when completed will be the best in the county. W. N. Harris, Esq., from Jamestown, was in town this week, and reports that the Little Gem mill on account of some decaying timbers broken down. Repairs are going on and Mr. Harris expects soon to have the mill in operation. The gentleman also reports that a few hands are employed at the Alabama mine, getting out rock, and doing exploration work.

**A DITCH.**—*Tuolumne Independent*, May 5: Mr. Harriman informs us that arrangements have been made between the Tuolumne Water Co. and Alvinza Hayward & Co., to build a ditch from Middle Camp to the Dead Horse mine, at Simmerville, a distance of seven miles; the water to be used to run the mill and other machinery of the mine. The work of building the ditch will be let in sections, and must be finished by the first of June. This will give work to all those who are at present seeking employment. Not only will this enterprise help the mine, but all living on the line of the ditch will hail its coming with delight.

#### NEVADA.

#### Washoe District.

**YELLOW JACKET.**—*Enterprise*, May 5: Are putting in two new boilers at the hoisting works, and the work is fast approaching completion. Are shipping 90 tons of white rock (gold bearing) to the Santiago mill daily.

**SAVAGE.**—Since last report the south drift on the 400 level has been advanced 22 feet, and continues in good ore. The southeast crosscut from this drift is extended 110 feet, 20 feet having been added to it during the week. The west crosscut from the face of the north drift from this level has been advanced 40 feet. The face is in fair-grade ore. On the 500 level the west drift from the new station has been advanced 22 feet, and the south drift to connect with it from the top of the 600 level upraise was extended 17 feet. Are extracting about 100 tons of ore daily of good quality from between the 400 and 500 stations, and are shipping to the Rock Point mill 70 tons. Have bullion on hand and previously shipped this month amounting to \$42,000.

**CROWN POINT.**—In consequence of an error in the survey, they have been compelled to drift 25 feet west from the top of the 500 upraise to connect with the bottom of the 400 level winze. The connection



has been made. The 600 level south drift has not been advanced. The east crosscut on the same level was advanced 22 feet during the week. Struck a clay wall the first two feet run, pitching at an angle of 75 degrees west, and the last 20 feet have been in quartz. Of this quartz the first 10 feet is good ore, carrying a large percentage of gold. The next 10 feet was of considerably lower grade; the next foot was a mixture of clay, porphyry and quartz, and last Tuesday good ore appeared in the face again, carrying a large percentage of gold and silver. No work has ever been done, either on the levels above or below, to show whether this ore goes up or down, and in the opinion of the superintendent it is impossible to tell whether it does or not.

**OCCIDENTAL.**—In the lower tunnel, 75 feet south of north incline winze, the incline upraise has been carried up four feet; total, 49 feet, and 150 feet south of the north incline winze the south drift has been extended four feet; total, 80. From this drift, at a point 35 feet south from the main tunnel, east crosscut No. 1 has been extended three feet; total, 11 feet. Eight tons of ore have been extracted.

**HALE AND NORCROSS.**—Are extracting from the 600 and 700 levels the usual amount of good ore. During the week have hoisted 1543 tons of ore, and have shipped to the Nevada and Mexican mills 1450 tons. The stopes throughout the mine are looking well. Have bullion on hand and previously shipped for this month amounting to \$138,000.

**BEST AND BELCHER.**—The west crosscut from the top of No. 2 upraise has been extended 27 feet; total, 47 feet. The formation is porphyry and quartz. From the bottom of the winze, 50 feet south of upraise No. 2, an east crosscut has been advanced 25 feet, passing through quartz showing some value.

**SEGREGATED BELCHER.**—The south drift from the 1300 level raise was advanced 12 feet during the week. The ground shows no change. Repairs in the 1300 level drift are progressing rapidly, 200 feet having been completed during the week.

**SCORPION.**—The south drift from the 300 level has been advanced 20 feet during the week, and its total distance is 233 feet. There is no change in the character of the ground worth reporting.

**UTAH.**—On the 372 level, at a point in the west crosscut 75 feet from the upraise, the south drift has been advanced 45 feet, passing through porphyry and quartz and a formation of nominal value.

**GOULD AND CURRY.**—During the week have extracted from the 250 and 300 levels and shipped to the Douglass mill 255 tons of ore, the average battery assay of which is \$29.14 per ton.

**KEYES.**—The east crosscut is in very favorable soft porphyry. North drift running parallel and near the hanging-wall is showing some rich ore, assays running from \$200 to \$400.

**BALTIMORE.**—Have got the new pumps working and are rapidly lowering the water preparatory to resuming work in the north and southwest drifts on the 350 level.

**ANDES.**—Are drifting east on the 350 level. The face is in quartz. Are still drifting north on the 240 level in low-grade ore with occasional spots of rich stuff.

**BELCHER.**—The 1300 level raise has been advanced 30 feet in quartz giving fair assays. Repairs to the 1300 level drift are progressing satisfactorily.

**BULLION.**—Are drifting east and west on the 640 level at the bottom of the winze. Have got about 70 feet east and started to crosscut west.

**CONFIDENCE.**—Are shipping at present daily to the Brunswick mill 200 tons of ore, the battery samples of which show a value of \$37.60.

**WEST CON. CAL. VA.**—Are sinking shaft and making good headway. Preparations for erecting steam-hoisting plant are in progress.

**IOWA.**—The south drift from the McBee tunnel has been advanced 21 feet; total, 78. The face of the drift is in ore showing fair assays.

**ALPHA.**—The north lateral drift on the 382 level is in 210 feet, and the winze 100 feet from the Alpha shaft on the 382 level is down 79 feet.

**CHALLENGE.**—The joint Jacket-Challenge west drift on the 1000 level is in 49 feet, having been advanced 23 feet during the week.

**CHOLLAR.**—North drift No. 2, on the 450 level, is in 515 feet in low-grade quartz.

**POTOSI.**—The southwest drift on the 450 level is in 350 feet in clay and porphyry.

**OVERMAN.**—Shipping 40 tons of ore daily to the Vivian mill. It is of fair grade.

**ALTA.**—Mill running steadily on ore from the 1150 and 825 levels.

**BENTON.**—The usual work is progressing on the 725 level.

#### Tuscarora District.

**DEL MONTE.**—*Times-Review*, May 5: Fair progress has been made in cleaning out and fitting up the tunnel.

**PONDRE.**—Main drift advanced 4 feet; rock hard, containing stringers of good ore. Face of drift shows an improvement as we advance. The end of crosscut from north drift is showing a five-foot ledge between well-defined walls, which improves as we advance. A crosscut has been started to cut a ledge 60 feet east, which prospects well on the surface. Have suspended No. 2 for the present, as we can cut the ledge from the main works at a greater depth and at less expense.

**NEVADA QUEEN.**—250-foot level: South drift from the station has been extended 14 feet in very hard rock. 350-foot level: The east crosscut from north drift has been stopped, and started a crosscut west in the vein, which has been driven 18 feet. The upraise has been extended up 11 feet; total from 196 feet; there has been quite an improvement during the past week, the ore being higher grade; assays average \$237 per ton.

**COMMONWEALTH.**—150-foot level: South drift from station has been extended 19 feet; at 160 feet cut into very fine ore 16 inches; cannot tell how wide the ore is, it still showing good ore; average assay, \$222.77 per ton. The drift started on the ore found 70 feet from the station has been driven 13 feet, showing good ore all the way; average assay, \$197 per ton.

**NAVAJO QUEEN.**—North drift from the west crosscut advanced 17 feet during the week. Bunches and streaks of good-grade ore are being met with.

**NORTH BELLE ISLE.**—Intermediate level stopes

are looking very well, as are also the stopes from 100-foot level of the Nevada Queen. The usual amount of ore has been sent to the mill and dumps during the week.

**GRAND PRIZE.**—Have started drifts east and west from south crosscut on the hanging-wall vein. The west drift is advanced 5 feet in a good width of high-grade ore. The east drift advanced 19 feet in stringers of ore.

**NAVAJO.**—Fair progress has been made with the work on the west vein south drift, 150-foot level. Stopes on the 350-foot level have produced the usual amount of ore.

**FOUND TREASURE.**—Southeast drift has been extended 12 feet. Upraise No. 3 has been carried up 14 feet; total, 38 feet; the face still showing good ore.

**NORTH COMMONWEALTH.**—The vein in the new shaft has been followed down and connected with the Found Treasure upraise.

**BELLE ISLE.**—Stopes have produced their usual amount of ore.

#### ARIZONA.

**ORE SHIPMENTS.**—Prescott *Courier*, May 1: Mines of Slate creek, Hassayampa district, are producing considerable ore. Dan Hatz has returned from 7½ tons of second-class ore. The shipment paid at the rate of \$45 per ton. He is now shipping between 16 and 18 tons of first-rate ore, and expects it to yield \$80 or \$90 per ton. W. W. Davis has sent four tons. All of this ore has gone and will go to the Argo works, Denver, Colo. W. A. Rowe has big dumps of ore. Smith & Bigelow are shipping. McDonald continues to send in rich Blue Dick ore. It is said in Prescott that P. A. Craigue has struck a large body of rich ore in the Buzzard mine. The *Courier* hopes that the rumor is true. Talk is that Mr. Leavick will very soon employ 24 additional miners in the Storm Cloud mine. Harland & Barrington are crushing rich gold ore from the Howard mine. Standard mill, on Groom creek, will be started on another run Tuesday or Wednesday next. There is great activity in Copper Basin, sinking shafts in the great copper mines. Col. Bean and others have looked out and located a route for a road, which will soon be built. Large shipments of ore are being made by miners of Walker and Big Bug districts. Mr. Rudy informs us that placer miners continue to make good wages by washing gold out of Skull valley gravel. Mining, mill and road building are being prosecuted in Martinez, Weaver and Bradshaw districts.

#### COLORADO.

**SAN JUAN.**—Silverton *Miner*, May 2: The Sunnyside mine is looking better than at any time since its location. The samplers will soon put on another shift and work day and night to handle the output. Trails to all of the mines are being opened and every pack animal in the county is busy. The Silver Bell at Ophir has increased its force and output at a rate of three tons per day. Wyman & Co. have the contract to pick the Bear output to Silverton. Five hundred tons are already out. The Silver Lake is getting ready to ship as soon as the trail is opened. Hundreds of tons are already to be packed to Stoiber's sampler. The Montezuma, at Ophir, has been doing deadwork all winter but will shortly increase its force and swell the output during the shipping season. Ten tons per day are coming in regularly from the North Star (Solomon). News was brought to town last Sunday of the richest strike ever made of wire and brittle silver in this county. Mr. Chas. Graf on making his usual visit to the mine last Sunday, learned that the night shift in the main tunnel had suddenly come upon an ore body the extent and richness of which has since been the subject of the wildest conjecture. In the breast of the tunnel, 350 feet below the surface and 800 feet from the mouth, now shows a streak of ore eight inches thick and nearly a solid mass of brittle silver. Wire silver curls in the pockets and cavities of the rock like miniature bunches of horse hair, and the specimens brought to town are the handsomest we have ever seen. The importance of this strike cannot be estimated. Its depth proves the permanence of our true fissure veins, and shows again that our mineral grows richer with depth. The Lackawanna tunnel is heading directly for the center of the group, which embraces over 70 acres of mineral claims.

#### DAKOTA.

**LEACHING WORKS.**—Deadwood *Pioneer*, May 2: Prof. Clark, accompanied by Mr. Franklin, of the Deadwood Reduction Co., yesterday paid a visit of inspection to the various sites below the city, hitherto discussed for the erection of leaching works. The site has not yet been definitely determined, but will be decided on at a meeting of directors to be held toward the close of the week. Mr. Clark goes to Rapid this morning to aid in Professor Carpenter's proposed test at the school of mines, in applying the leaching process to Bald mountain ores. On the Silver Queen, always a favorite Galena location, recent very encouraging discoveries have been made. A new tunnel was started, in which a large body of good galena ore has already been struck. Owners feel jubilant and are rapidly pushing explorations.

**CINNABAR.**—The reporter was yesterday shown a very pretty specimen of cinnabar, from the White Ridge claim, south of Elk mountain. The location is the property of Jno. F. Barry and others who intend considerable developments this summer.

#### IDAHO.

**GALENA BELT.**—Coeur d'Alene *Record*, April 25: Since the sale of the Fuller, Green Mountain and Burke claims and the organization of the Poorman Extension Co., the order for lumber for the Poorman concentrator has been increased from 150,000 feet to 400,000 feet. The concentrator will begin its work with a daily capacity of 150 tons instead of 50 or 60 tons as was first intended. The shipments of concentrates and first-class ore from this great mine alone will then be about 40 tons per day. The product of the Tiger is now 25 to 30 tons. Suppose the Tiger and Poorman Companies handle 25 tons of ore per day, obtaining at least 65 tons of concentrates, worth in the neighborhood of \$40 per ton. A little figuring shows us that such a product would represent a value of \$2600 per day, \$78,000 every 30 days and about \$800,000 per year. Other properties in

that district will be producing to such an extent as to warrant the very conservative assertion that Canyon creek mines alone will soon be adding to the enormous mineral product of Coeur d'Alene at the rate of at least \$1,000,000 annually. Now it is not likely to be more than a few months at furthest before shipments will begin from a number of valuable properties in three other galena districts, viz., Evolution, Placer Center and Hunter, which include within their limits such claims as the Polaris, Argentine, Black Bear, Granite, California, Hunter, Morning, Evening, Central and many others, which, with development, may take rank among the greatest producers. The present outlook is so bright that no one well acquainted with the wonderful resources of Coeur d'Alene will consider it extravagant to estimate the probable silver-lead production before the close of 1889 at 6500 tons of concentrates per month, or at the rate of 75,000 tons per year, representing a cash value at the mines of \$3,000,000. Miners and mine-owners will soon be able to profit by an advantage that has not hitherto been afforded them. Mr. Frederick Burbridge, the present gentlemanly agent of the Holden Smelting works of Denver, is about to establish sampling works at Coeur d'Alene City. The erection of the building has already commenced and he expects to have the works in operation within two weeks.

**A WONDERFUL MINERAL BELT.**—Wardner *News*, May 1: Evolution district is rapidly coming to the front as a mining center and at present presents a map of busy life. A number of very promising locations are being worked in that vicinity, while a confidence pervades those interested that is truly encouraging. The West Point group, containing the Nellie, West Point, Sierra Nevada and Rosebud, are owned by Horton and Alger. The Nellie mine is opened by three tunnels aggregating 350 feet; there are now about 30 tons of ore on the dump which the owners propose shipping to the sampling works at Coeur d'Alene City at an early day. There is ore in all the tunnels, each tunnel being on a different chute on the same vein, and the different chutes are of various grades, ranging from 50 to 1000 ounces silver, dry ore. The owners are working hard to develop the property into a paying proposition and will continue operations steadily through the summer. The ledge on each of the other locations of this group is well defined, showing a grade of ore varying from 17 to 150 ounces, also dry ore, this being merely on the surface. The worthy owners are much elated at the prospect of the whole group, and Captain Horton speaks with a degree of confidence truly inspiring, feeling convinced that himself and partner will shortly be enabled to see other men hard of muscle and strong in the back, doing a lot of the hard work. The Mineral Point lode at Osborn, owned by Bill Osborn and others, is looking finely. The ledge has been struck several hundred feet below the old workings and displays a body of fine gray copper ore. On the same belt is located the Yankee Boy, on Big creek, owned by the Blake boys, who have a remarkably fine showing, and are taking out at present very rich ore. The Polaris is of equal importance, and will, before the summer is over, be reckoned among the most valuable properties in the country. Between the famous Argentine and the Mineral Point there are a number of good locations carrying the same ore for a distance approaching 8 miles.

**BUCKSKIN.**—Ketchum *Keystone*, May 3: It is reported that the St. Louis Co., working the Buckskin mine near Stanley Basin, have cut their vein with a tunnel at considerable depth from the surface. The ore at the point of intersection of the tunnel with the vein seems to be of a low-grade in character. Although the vein may be strong and well defined, yet it frequently occurs in running long crosscut tunnels to tap a vein, that when an intersection is made, it will be found some distance from the ore chute exposed near the surface. In the case of the Buckskin tunnel, the ore chute will no doubt be found by drifting on the tunnel level, but how far the company will be obliged to drift, and how soon the contact can reasonably be made are questions of doubt and great uncertainty. The Buckskin mine has the reputation of being a meritorious property, and the fact of not encountering good ore by means of the tunnel is no detriment whatever to the value of the mine.

**LAD OFF.**—Nearly all the force of miners employed at the Parker group of mines have been laid off. This movement on the part of the managers is said to be only temporary, and when work is resumed again, it will be more vigorously prosecuted than before. It is reported that very fine progress has been made of late in the course of development of this fine mining property. Mr. Clemens came in yesterday from the Carolina mine in Greenhorn gulch. He brought in some very handsome specimens of galena and sand carbonates. The galena assays 180 ounces silver and 70 per cent lead. The ore chute on the Carolina is reported to be 100 feet in length. News was received yesterday that a fine strike of rich ore had been made in the True Friend mine, situated on the Elkhorn belt, a few miles from town. The ledge is reported to be three feet wide. The samples of ore brought in are certainly very fine. All the reports of the steady and flattering developments being made at the different mines at East Fork are daily being verified. When the noted North Star mine resumes operations again, the miners of that meritorious locality may confidently expect a considerable boom.

#### MONTANA.

**BASIN'S BOOM.**—*Inter-Mountain*, May 3: The old and for a long time dilapidated burg of Basin has awoke from its Rip Van Winkle snooze of many years, and is now building and improving rapidly. Several of the best prospects are not doing anything just now, waiting for the other road, and part of them are in litigation, that curse of all mining camps. The Buster mine, owned by Kleinschmidt & Co. of Helena, is being operated by Maxwell, Doyle & Co., under a lease. They have a nice body of ore and have just started up the arastra above town. They expect to be able to reduce about two or three tons per day in this way and save up to a fair percentage of its value. They feel confident of averaging \$25 a ton.

**A NEW ENTERPRISE.**—A company of Eastern capitalists from Philadelphia have secured title to a quantity of the placer ground some nine miles up Basin creek, and are spending a large sum of money developing it. They are incorporated under the name of the Penn Placer Mining Co. Last season

they put in a sawmill and ditched, and flumed the water from Basin canyon down to their location. It is high enough to give them about 150 feet of pressure for hydraulic purposes. They then went to the lower end of the flats and built a large flume to carry all the water in the creek, dammed the bank, turned it into this large flume, and run it off over a bar. They are now operating in the bed of the creek, preparing to put in a four-foot bedrock flume. The enterprise is a worthy one and has the appearance of being a profitable one in the near future. The prime mover of the enterprise is Rev. Wm. B. Reed, who at one time filled a pulpit in Helena. The work at the present stage is being superintended by Mr. Walsh. They are working about 30 men and increasing their numbers as fast as they can make room for them. This flat that they are expending so large an amount of money to open is some three miles below the old placer diggings that have been profitably worked for the last 18 years, and two or three companies are still operating them.

**GRANITE.**—*Inter-Mountain*, May 1: "I was a little surprised to see Granite drop \$3 a share, last week," said a leading mining man. "Of course everybody may not know the significance of cutting the dividends down one-half for the next four months, and of course manipulators on the stock exchange will do all they can to keep small holders in ignorance and to create a panic. The real fact of it is, as everybody here knows, that the reduction of dividends for a short time is for the excellent purpose of doubling the old figures for keeps as soon as the new mill is up, thus paying \$1 per share each month."

**COMBINATION.**—The mill at the Combination Co.'s mines will be started as soon as the Free vanners, which are now being put in, are ready for work. This will be in a very few days. Twenty-five hundred shares of the stock were sold Saturday at 50 cents, which is 150 per cent advance since the new organization was effected. The stockholders of the combination will be glad to learn that the litigation in which the company has been involved for some time past has at last been settled finally, and on a basis that was very favorable to the company.

**THE HOPE.**—"What's new at the Hope?" was asked of Mr. Adams, superintendent of that steady old producer, while he was in town yesterday. "Nothing much," was the reply, "only that we've got plenty of good ore, but that is not anything particularly new, for we've never been out of ore."

**THE SAN FRANCISCO.**—"How about the reported strike in the San Francisco?" Mr. Adams was asked. "I don't know anything about it further than this, that it is the current report in Phillipsburg that the San Francisco opened up a fine body of rich ore last week, and I guess there is no doubt of it being correct."

**AMY-SILVERSMITH.**—Work on the Amy-Silver Smith has been resumed, though on a somewhat small scale, only five or six men having been put on. The force it is understood will soon be increased.

#### OREGON.

**SPARTA.**—Bedrock *Democrat*, May 1: The mines are booming. Owing to a scarcity of free water, placer mining thus far has not been as extensive as usual, but when the Sparta canal is ready to deliver water, the work will commence in earnest, and the recent new discoveries will furnish employment for many men. Del Monte tunnel No. 2, cut the ledge at 215 feet, and work has been pushed day and night, and several hundred tons of good pay-ore is now on the dump. The vein is full 8 feet wide and the output of ore is 30 tons daily. The tunnel is first-class work, and is now under cover 279 feet. Tunnel No. 2, on the Gold Ridge, cut the vein at 75 feet, where a drift has been run on the vein (which is full 4 feet) 29 feet. Tunnel No. 2, on the 125 level below No. 1, is within 6 feet of vein cut in upper tunnel and will be continued until the ledge is reached. Notwithstanding very little is said or known of us on the outside, more permanent development has been done the past 6 months in this camp than any other in Eastern Oregon, and we have the ore on the dumps to show what we have been doing. The Sullivan group, lately examined by the well-known mining expert, S. S. Burt of Chicago, and on which property 3,464,000 tons of ore averaging \$15 in gold to the ton was reported, will soon pass into the hands of an Eastern syndicate and work on an extensive scale will commence early in May.

#### UTAH.

**OPHIR.**—Salt Lake *Tribune*, May 2: Isaac Roland of Ophir sends word that after having struck a big body of ore in his mine the other day, he had the misfortune to fall from the apex of the lode and bruise himself up considerably.

**TINTIC.**—Tintic is sending out from 10 to 13 carloads of ore per day. On Monday the Salt Lake & Western brought out 11 carloads of silver ore and two cars of iron ore. The mines are looking unusually well and are being worked to a greater extent than in the past. Mr. Chisholm, manager of the Centennial, Eureka, Tintic, received two carloads of rich silver ore in the past three days. This mine may now be classed as a regular ore-producer. The Bullion-Beck & California Co.'s property at Eureka, under the able management of W. H. Smith and Captain H. H. Day, is producing well, and what is better, the mine looks as if it was going to produce for an indefinite length of time. The property never before looked so well. New ground is being continuously opened up, so that there is immense stopping ground ready for extracting the ore.

**DEEP CREEK.**—J. F. Woodman, who is operating in the Deep creek country, is expected in this city in a few days. He and other mining men out there have become tired waiting for the Salt Lake & Los Angeles railway, so they propose to test the practicability of hauling high-grade ores to this city for reduction. For this purpose Mr. Woodman is bringing in five tons of ore, and if it is found to pay such long hauls, teams will be put on this road to bring in large quantities of ore.

**COAL.**—S. H. Gilson came in yesterday from the coal mines near Sunnyside. He reports several tunnels having been run in, one over 100 feet long, and the face in which the coal lies is 16 feet thick. He says this coal is all in point of quality and quantity that they have claimed for it, and predicts that the mine will soon become a large producer.



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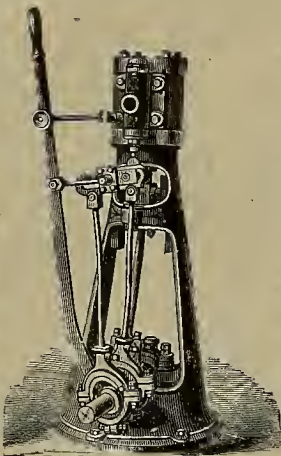
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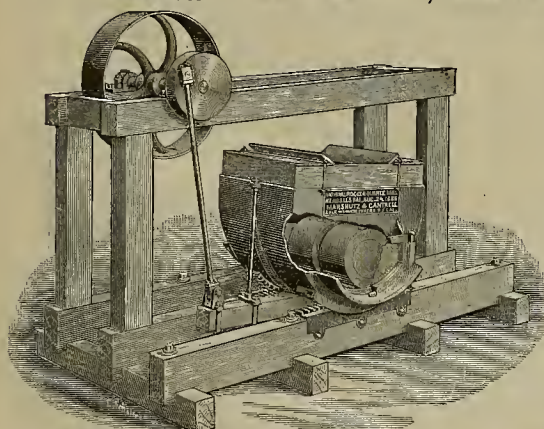
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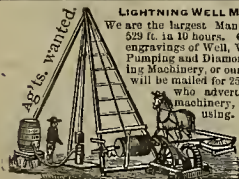
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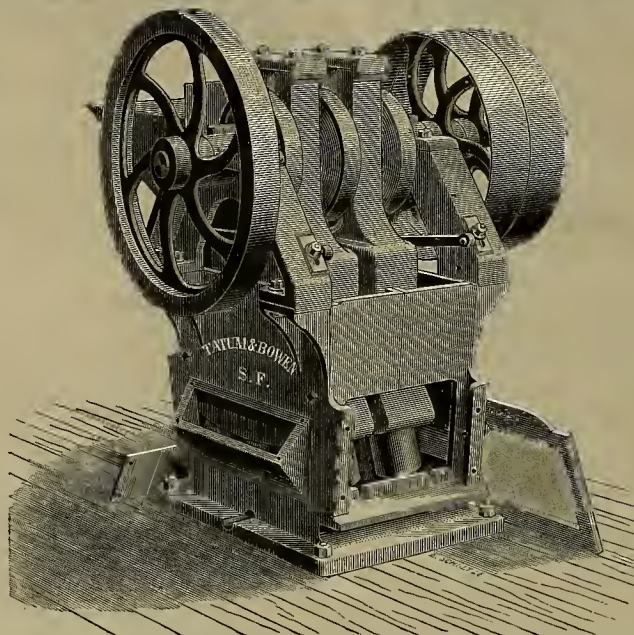
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The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

## AN AUTOMATIC ORE FEEDER

Goes with each Mill. We also have a snitable

### Rock Breaker.

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

TATUM & BOWEN,

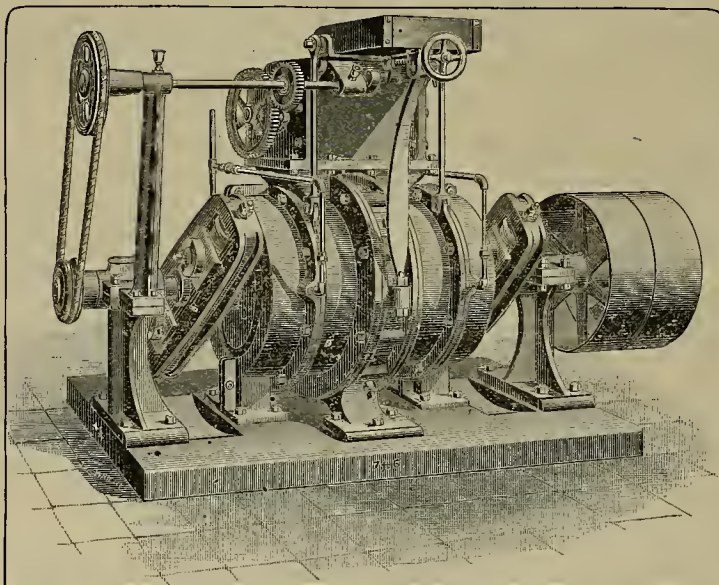
34 and 36 FREMONT STREET,

SAN FRANCISCO, CAL

Manufacturers of Miniog and Sawmill Machinery, Engines, Boilers, Etc.

## FRISBEE WET MILL.

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.

OUR DRY MILLS are the most economical ever built, and are extensively used with record of several years. No grinding in pans. Mill finishes to any fineness desired.

### FRISBEE-LUCOP MILL COMPANY,

GIDEON FRISBEE, Manager.

461 Howard St., San Francisco

HOOKER & LAWRENCE, Gen'l Ag'ts, 145 Broadway, New York.



## STURTEVANT MILL.

This Mill as a Crusher and Pulverizer is without rival.  
Is in operation in each of the great smelting works and mills.

SEND FOR CATALOGUE AND TESTIMONIALS.

MACHINERY for SYSTEMATIC MILLING, SMELTING, and CONCENTRATION of ORES.

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ENGINES

—AND—

MACHINERY,

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# FRASER & CHALMERS, MINING MACHINERY,

ENGINES AND BOILERS.

Huntington Centrifugal

QUARTZ MILL.

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CORNISH ROLLS,

JIGS and TROMMELS.

HOISTING

ENGINES,

HALLIDIE'S

WIRE ROPE

TRAMWAYS.



## Metallurgy and Ores.

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SMELTING and LEAD CO.

416 Montgomery St., San Francisco.

GOLD AND SILVER REFINERY  
And Assay Office.

Highest Prices Paid for Gold, Silver and Lead Ores and Sulphurets.

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BLUESTONE,

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SHOT, Etc., Etc.

ALSO MANUFACTURERS OF

Standard Shot-Gun Cartridges,  
Under Chamberlin Patent.

JOHN TAYLOR & CO.,

IMPORTERS AND DEALERS IN

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AND MILL SUPPLIES,

CHEMICAL APPARATUS AND CHEMICALS, DRUG  
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We would call the attention of Assayers, Chemists, Mining Companies, Milling Companies, Prospectors, etc., to our full stock of Balances, Furnaces, Mullers, Crucibles, Scorifiers, etc., including, also, a full stock of Chemicals.

Having been engaged in furnishing these supplies since the first discovery of mines on the Pacific Coast, we feel confident from our experience we can well suit the demand for these goods, both as to quality and price. Our New Illustrated Catalogue, with prices, will be sent on application.

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Near First and Market Streets, S. F.

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Ores worked by any Process.

Ores Sampled.

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Working Tests (practical) Made.

Plans and Specifications furnished for the most suitable Process for Working Ores.

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THE RUSSELL PROCESS COMP'Y.

C. A. STETEFELDT, President.

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The principle of pulverization consists in the employment of two

POWERFUL OPPOSING CURRENTS

Of dry super-heated steam, so arranged that they continuously charge themselves with crushed or granulated material, and by the great force and velocity of the steam currents the minerals are dashed against each other with such power of concussion as to cause the hardest ores to be pulverized to any degree of fineness desired. The high temperature of the super-heated steam currents employed, through which every minute particle of ore must pass, causes them to become very hot and dry, which produces a beneficial effect upon Sulphurets and ores containing rusty Gold. The light weight and simplicity of construction of the Pulverizer, the extremely small and inexpensive wearing parts, are the WONDER and SURPRISE of all who witness its operation. The Company is prepared to furnish complete plants for pulverizing

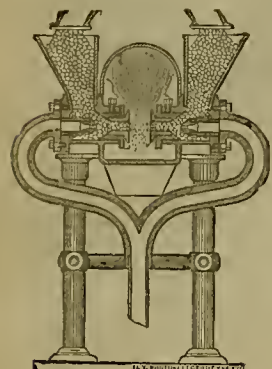
10 TO 200 TONS PER DAY,

Including a Sectional Steam Boiler supplying all the power required.

PNEUMATIC PULVERIZER COMPANY,

2 and 4 Stone Street, NEW YORK.

Write for Particulars.



Sectional View of Pulverizer.

L. F. HOLMAN, Pres't.  
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## JAMES LEFFEL'S Mining Turbine Water Wheel.

These Wheels are designed for all purposes where limited quantities of water and high heads are utilized, and are guaranteed to give more power with less water than any other wheel made. Being placed on horizontal shaft, the power is transmitted direct to shafting by belts, dispensing with gearing.

Estimates furnished on application for wheels specially built and adapted in capacity to suit any particular case.

Further information can be obtained of this form of construction, as well as the ordinary Vertical Turbines for Wooden Penstocks and in Iron Globe Cases, free of cost, by applying to the manufacturers.

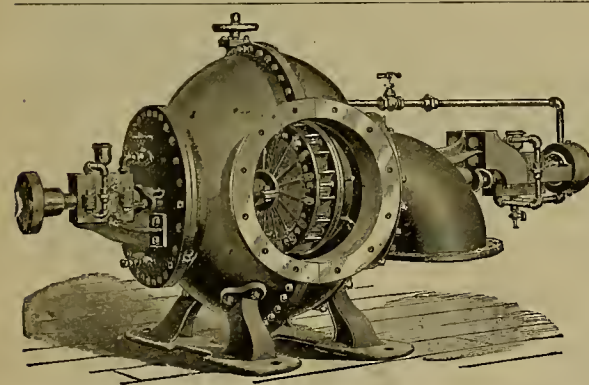
JAMES LEFFEL & CO.,

Springfield, Ohio,

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FRASER & CHALMERS, General Agents,  
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## N. W. SPAULDING SAW COMPANY

Manufacturers of

SPAULDING'S

Inserted Tooth

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CHISEL BIT

CIRCULAR

Saws.

SAW MILLS AND MACHINERY  
Of all kinds made to order. Send for Descriptive Catalogue. 17 and 19 Fremont St., San Francisco.

San Francisco Cordage Factory.  
Established 1858.

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc.

Extra sizes and lengths made to order on short notice

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611 and 613 Front St., San Francisco.

This paper is printed with Ink Manufactured by Charles Eneu Johnson & Co., 500 South 10th St., Philadelphia. Branch Offices—47 Rose St., New York, and 40 La Salle St., Chicago. Agent for the Pacific Coast—Joseph H. Dorey, 529 Commercial St., S. F.



ARE YOU GOING TO PUT UP MACHINERY OF ANY KIND?

Are you going to make any change in machinery? Do you want Pulleys on Shafting already up? If so, don't fail to look into the merits of

THE DODGE PATENT INDEPENDENCE

WOOD SEPARABLE OR SPLIT PULLEYS.

They are the Lightest, Strongest, Best Balanced and

Most Convenient Pulleys Made in the World.

Entirely new and original. Adapted to any power required. Time, trouble and money saved by using these pulleys.

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## THOMAS PRICE'S ASSAY OFFICE,

CHEMICAL LABORATORY,

BULLION ROOMS and ORE FLOORS,

524 Sacramento Street, San Francisco, Cal.

COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed of in the Open Market to the Highest Bidder.



## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING MAY 1, 1888.

- 382,131.—HORSESHOE—J. E. Bingham, Walla Walla, W. T.  
 382,072.—NAIL OR RIVER FOR BOOTS OR SHOES—A. G. Cavalli, S. F.  
 382,142.—PIPE-RIVETING MACHINE—Geo. Cumming, S. F.  
 382,038.—PRINTER'S RULE CASE—M. C. Harris, San Jose, Cal.  
 382,002.—TRACE ATTACHMENT—W. J. Howard, Mariposa, Cal.  
 381,951.—FIRE KINDLER—Jas. Randall, S. F.  
 382,005.—STATION INDICATOR—Mary J. Watson, Sacramento.  
 18,280.—DESIGN SIDEWALK DEAD-LIGHT FRAME—P. H. Jackson, S. F.
- NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DESIGN FOR SIDEWALK DEADLIGHT FRAME.—P. H. Jackson, S. F. No. 18,280. Dated May 1, 1888. The invention consists of a novel design for an iron frame. The design consists in the peculiar configuration of upwardly projecting points. The leading feature of the design is the triangular-shaped projections or spurs arranged equi-distant from each other around each of the openings, so that while a part of the points are common to each of the adjacent openings the set of points around any one of the openings will form the appearance of a star.

PIPE-RIVETING MACHINE.—Geo. Cumming, assignor of one-half to Francis Smith, S. F. No. 382,142. Dated May 1, 1888. By this mechanism pipe sections may be very rapidly riveted up with the least amount of handling, and by means of the movable or traveling hydraulic cylinder, with its plunger and the automatic mechanism for advancing it, the work is rapidly completed.

## Mining Share Market.

The condition of the mining stock market does not now so singularly affect the mining industry proper as was formerly the case. The Virginia Enterprise says: The stock market has entirely divorced itself from the condition of the mines on the lode and started business on its own hook. The big holders are allowing it to drift without sail or rudder, and the small chippers and bears are eking out a miserable existence by bearing their united weight on the market all they can. There will be no revival until the big bulls get on one rope and pull together to steer the market where the condition of the mines says it should be, and that is much higher than now.

Confidence steps forward and takes her place among the dividend-payers of the Comstock by giving to each and every holder for each and every share \$2, amounting to nearly \$50,000. This, with Norcross's \$50,000 dividend and \$108,000 from Con. Cal. Va., makes a total sum paid in dividends of \$214,000. The amount paid for wages on the Comstock last month was \$231,000, making a distribution in these two items of \$445,000. It is safe to estimate the other expenses of the mines at an equal figure with the amount paid for wages, bringing the grand total up to \$676,000 paid out by Comstock mining companies for dividends and running expenses in April. A very lively corpse is the old lode.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Con. California and Virginia, May 5th, \$122,000; and 9th, \$125,000—total for April, \$418,000; Hanauer, 4, \$1600; Germania, 4, \$2441; Hanauer, 6, \$1650; Moulton, 3, \$18,659; Savage, 8, \$10,700; North Belle Isle, 8, \$40,000; Confidence, 5, \$14,832; and 8, \$20,595; Silver Bow, 3, \$19,912; Hanauer, 3, \$1575; Silver Reef—for April—\$31,984; Germania, 5, \$4100; Hanauer, 5, \$1575; Mt. Diablo, 9, \$8762.

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

JOHN G. H. LAMPADUS—San Luis Obispo Co.  
 G. W. INGALLS—Arizona Territory.  
 A. F. JEWETT—Tulare Co.  
 O. E. WILLIAMS—Yuba and Sutter Co.'s.  
 R. G. HUSTON—Montana Territory.  
 E. H. SCHAEFFER—Butte Co.  
 S. J. LUTHERFIELD—San Diego Co.

J. A. JOHNSON, 307 Montgomery street (the Nevada Bank building) is the general agent of the Stiles quartz machinery, and offers easy terms for introduction.

## News in Brief.

THE recent fire in San Diego caused damages to the extent of \$200,000.

ONE firm in San Jose sold over two tons of strawberries last Saturday.

THE Los Angeles Cracker Co.'s factory was burned last week; loss, \$50,000.

THE auction sale of foothill lands at Lincoln, Placer county, realized \$23,000.

INCREASING population has forced Redding to use additional power to supply water to the city.

COAL has been found in the Buttes, near Sutter City. It is a lignite much like that mined at Ione.

THE Copper Queen Co. at Bisbee, Arizona, discharges its miners if they are caught gambling.

THE City Council of San Diego has fixed the tax levy at 89 cents on a valuation of \$18,000,000.

THE Folsom prison has sold \$89,950 worth of granite curbing and coping since sales to the public were resumed.

A NOTED baseball player was killed at Indianapolis lately by the ball from the pitcher's hand, hitting him in the temple while striking.

THE Marysville Woolen Mills are still six months behind with their orders, finding it impossible to keep pace with the demand of their goods.

THE old San Fernando mission is to be preserved. The old church is to be repaired, and the many curiosities will be taken care of properly.

It is said that oil-fields more extensive even than those of the Caspian have been discovered in the Mackenzie River valley, close up to the Arctic circle.

THE salient point of the preface to General Boulanger's book is his advocacy of the right of the army to have a voice in the question of peace or war.

THE arrival of immigrants in this country for the first three months of 1888 were 5325 in excess of the arrivals for the corresponding months in 1887.

## San Francisco Metal Market.

WHOLESALE.		THURSDAY, May 10, 1888.	
ANTIMONY—French Star.	9 @	91	
BORAX—Refined.	— @	7	
Powdered.	7 @	—	
Concentrated.	6 1/2 @	—	
COPPER—	26 @	—	
Sheathing.	26 @	—	
Ingot.	— @	26	
Fire Box Sheets.	— @	26	
Iron—Glengarnock ton.	— @	23	
Eginton, ton.	— @	23	
American Soft, No. 1, ton.	— @	43	
Oregon Pig, ton.	21 @	23	
Clay Lign White.	— @	23	
Shot, No. 1.	— @	23	
Lead—Pig.	5 20 @	5 50	
Bar.	5 20 @	5 50	
Sheet.	8 @	—	
Shot, discount 10% on 500 bag.	1 80 @	—	
Buck, 7 bag.	2 00 @	—	
Chilled do.	2 00 @	—	
STEEL—English, 14.	16 @	20	
Black Diamond tool.	10 @	16	
Pick and Hammer.	8 @	10	
Machinery.	6 @	8	
Tool Calk.	1 1/2 @	—	
TINPLATE—Coke.	5 75 @	6 50	
Charcoal.	6 75 @	7 25	
QUICKSILVER—By the flask.	35 00 @	40 00	
Flasks, new.	1 00 @	—	
Flasks, old.	85 @	—	

## New York Metal Market.

Telegraphic advices dated May 3d give the following New York prices:

BAR SILVER—92 1/2 per oz.  
 BORAX—9c.  
 COPPER—LARK—\$16.45.  
 IRON—No. 1, \$22.00.  
 LEAD—\$4.40.  
 TIN—\$21.00.

The following is the latest by mail from the "New York Metal Exchange Market Report":

COPPER—Dull, spot closing at \$16.30 to \$16.45. Transferable Notices (Lake) issued at \$16.20 to \$16.30.

LEAD—Steady, at \$4.65 to \$4.75 spot. Transferable Notices issued at \$4.40.

TIN—Nominal at \$21.00 to \$21.00.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery.

Australian Tin, — @; Billiton Tin, — @; Banca Tin, — @; Baltimore Copper, \$15.00 to \$15.40; Orford Copper, \$16.00 to \$16.05; P. S. C. Copper, — @; Foreign Lead, \$9.10 to \$9.15; Foreign Spelter, \$6.00 to \$6.12; Antimony, \$10.75 to \$11.00.

FRISBEE-LUCOP MILL.—Two Frisbee-Lucop mills have been shipped to the new cement works at Portland, Oregon. These mills have each a capacity of from two to three tons per hour. A Frisbee wet-mill has also been shipped to the Copper Queen mine in Arizona. After the tailings leave the jigs they run to this mill, which will reduce them for further concentration.

THE National City Record denounces the Lower California gold stories as a tissue of falsehood, and remarks that "it is rather strange that men who claim to be able to take out \$10,000 a month from the placers should be wasting their time about San Diego, bragging about their finds, and telling the world where the wonderful riches are stored."

## Practical Treatise on Hydraulic Mining.

By AUG. J. BOWIE, Jr.

This new and important book is on the use and construction of Ditches, Flumes, Dams, Pipes, Flow of Water on Heavy Grades, methods of mining shallow and deep placers, history and development of mines, records of gold washing, mechanical appliances, such as nozzles, hardy-guards, rockers, undercurrents, etc.; also describes methods of blasting; tunnels and sluices; tailings and dump duty of miners' inch, etc. A very practical work for gold miners and users of water. Price, \$5, postpaid. For sale by Dewey & Co., Publishers, 252 Market St., San Francisco.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

COMPANY.		LOCATION.		No. AM'T. LEVIED.		DELINQ'T. SALE.		SECRETARY.		PLACE OF BUSINESS.	
Arnold & S. M. Co.	California.	4.	75.	May 1.	June 4.	June 26.	A. Judson.	320 Sansome St.			
Bulwer Con M Co.	California.	4.	20.	May 3.	June 7.	May 28.	L. Osborn.	309 Montgomery St.			
Battle Creek Hyd M Co.	California.	12.	65.	Mar. 27.	May 7.	May 28.	J. R. Levy.	213 Market St.			
Baltimore S M Co.	Nevada.	1.	25.	Apr. 10.	May 21.	June 8.	W. L. Brown.	402 Montgomery St.			
Crown Point M Co.	Nevada.	49.	50.	Apr. 13.	May 16.	June 6.	J. Newlands.	329 Pine St.			
California State Co.	California.	1.	10.	Apr. 18.	May 24.	June 25.	J. H. Hanscom.	10 California St.			
Gray Lignite M Co.	California.	1.	30.	May 1.	June 2.	June 22.	T. Wetzel.	322 Montgomery St.			
Golden Prize M Co.	Nevada.	1.	25.	Apr. 21.	May 25.	June 16.	C. D. Bennett.	328 Montgomery St.			
Justice M Co.	Nevada.	46.	25.	May 7.	June 11.	July 2.	R. E. Kelley.	419 California St.			
Mayflower Gravel M Co.	California.	41.	25.	Apr. 9.	May 14.	June 4.	J. Morizio.	328 Montgomery St.			
Navajo M Co.	Nevada.	19.	30.	Apr. 12.	May 17.	June 7.	J. W. Pew.	310 Pine St.			
Peoples M Co.	Nevada.	11.	25.	Apr. 4.	May 7.	June 28.	A. Waterman.	309 Montgomery St.			
Paradise Valley M Co.	Nevada.	5.	15.	Apr. 21.	May 29.	June 18.	A. Chemant.	328 Montgomery St.			
South End M Co.	Nevada.	—	10.	Apr. 4.	May 7.	May 23.	E. N. Van Brunt.	318 Pine St.			
Sierra Nevada S M Co.	Nevada.	91.	25.	Apr. 3.	May 8.	May 28.	E. L. Parker.	309 Montgomery St.			
Trojan M Co.	Nevada.	17.	10.	Mar. 27.	May 4.	May 28.	J. F. Holling.	533 Kearny St.			
Trust M Co.	California.	1.	19.	May 1.	June 5.	June 27.	E. L. Busling.	309 Montgomery St.			
Utah Con M Co.	Nevada.	4.	25.	May 4.	June 8.	June 26.	A. H. Fish.	300 Montgomery St.			

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING DATE
P & F Con M Co.	Nevada.	J. W. Pew.	310 Pine St.	Annual. May 12
Scorpion M & M Co.	Nevada.	G. R. Spindley.	310 Pine St.	Annual. May 14

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A. W. Havens.	309 Montgomery St.	50.	May 10
Confidence S M Co.	Nevada.	A. S. Giddens.	260 Montgomery St.	20.	May 10
Eureka Con M Co.	Nevada.	H. R. P. Hutton.	306 Pine St.	25.	May 7
North Belle Isle M Co.	Nevada.	J. W. Pew.	310 Pine St.	50.	May 7
Hale & Norcross S M Co.	Nevada.	A. H. Clough.	—	50.	May 7
Regoon Coal & Navigation Co.	Oregon.	R. B. Williams.	211 Sansome St.	150.	Mar. 2
Pacific Harb. Salt & Soda Co.	California.	H. Clough.	220 Montgomery St.	1.00.	May 10
Standard Con M Co.	California.	J. W. Pew.	310 Pine St.	50.	May 12

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING APR. 19.	WEEK ENDING APR. 26.	WEEK ENDING MAY 3.	WEEK ENDING MAY 10.
Alpha.	2.15	2.60	2.55	2.75
Alta.	1.75	2.05	1.90	2.00
Battle Creek.	1.35	1.60	1.55	1.65
Argenta.	1.15	1.35	1.30	1.40
Belcher.	6.00	7.25	6.50	7.00
Brophy.	—	—	—	—
Best & Belcher.	4.60	5.25	4.80	5.25
Bullion.	1.50	1.50	1.50	1.50
Baltimore.	.65	.90	.70	.80
Belle Isle.	.60	.55	.65	.55
Bodie.	2.50	2.70	2.55	3.00
Benton.	—	2.50	—	2.50
Bodie Tunnel.	.75	.85	1.00	.85
Bulwer.	.75	.85	1.00	.85
Con. Va. & Cal.	12 1/2	14 1/2	14 1/2	13 1/2
Challenge.	7.25	8 1/2	9.75	8.25
Champion.	—	—	—	—
Chollar.	—	—	—	—
Confidence.	27 1/2	30	35	42
Con. Imperial.	5.00	6.00	5.50	7.50
Caledonia.	.55	.60	.70	.65
Con. Pacific.	—	—	—	—
Crocker.	.85	1.00	.95	1.30
Crocker.	.85	1.00	.95	1.30
Dudley.	—	—	—	—
East E. & B.	—	—	—	—
Eureka Con M Co.	1.15	1.75	1.50	1.60
Exchequer.	1.45	1.75	1.50	1.60
Grand Prize.	2.30	2.65	2.40	2.80
Gould & Curry.	4.05	4.50	4.30	4.85
Hale & Norcross.	5.75	9 1/2	9 1/2	8 1/2
Holmes.	—	—	—	—
Independence.	—	—	—	—
Iowa.	1.25	1.35	1.25	1.10
Julia.	.50	.55	.60	.55
Justice.	2.75	3.00	2.80	3.15
Kentuck.	.45	.50	.55	.45
Lady Wash.	.45	.50	.55	.45
Martin White.	—	—	—	—
Mono.	1.50	1.70	1.65	1.85
Mexican.	1.50	1.65	1.50	1.70
Mt. Diablo.	—	—	—	—
Northern Belle.	1.45	1.70	1.60	1.80
Navajo.	1.45	1.70	1.60	1.80
North Belle Isle.	.50	.55	.60	.55
Niagara.	—	—	—	—
Key. Union.	4.00	4.25	4.15	4.35
North G. & C.	—	—	—	—
Occidental.	1.75	1.90	1.75	1.85
Ophir.	2.15	2.35	2.20	2.45
Promont.	2.15	2.35	2.20	2.45
Potosi.	1.10	1.20	1.10	1.20
Peoples.	1.35	1.50	1.40	1.60
Pet.	.60	.65	.70	.65
P. Sheridan.	—	—	—	—
Silver Star.	—	—	—	—
Savage.	4.95	5.25	5.75	5.15
S. B. & M.	4.45	5.00	5.25	4.60
Sierra Nevada.	3.90	4.70	4.40	4.50
Silver Hill.	.60	.65	.70	.65
Silver King.	.65	.70	.75	.70
Scorpion.	.65	.70	.75	.70
Syndicate.	—	—	—	—
Union Con.	1.60	1.70	1.65	1.75
Utah.	.60	.65	.70	.65
Yellow Jacket.	.50	.55	.60	.55

## Sales at San Francisco Stock Exchange.

WEDNESDAY May 9.	50 Justice.	85c
100 Alpha.	2.05	60c
100 Alta.	1.60	50c
100 Battle Creek.	1.30	40c
100 Baltimore.	.60	30c
100 Belcher.	5.125	4.45
1240 Best & Belcher.	4.60	3.90
330 Bullion.	1.50	1.60
265 Bodie.	2.70	2.75
50 Benton.	2.00	2.00
200 Belle Isle.	.55	1.45
50 Bulwer.	.85	2.45
50 Challenge.	.45	1.00
300 Chollar.	1.40	4.20
250 Con Va & Cal.	12	.5
2450 Crocker.	1.40	.65c
300 Crown Point.	.55	3.55
200 Eureka.	.80	.05
500 Exchequer.	1.30	.60c
300 Gould & Curry.	4.40	3.50
100 Grand Prize.	2.20	1.60
170 Hale & Nor.	.75	.75c
50 Iowa.	1.00	.65

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Should this paper be received by any subscriber who does not want it, or beyond the time he intends to pay for it, let him not fail to write us direct to stop it. A postal card (costing one cent only) will suffice. We will not know until we receive the paper to anyone who does not wish it, but if it is continued, through the failure of the subscriber to notify us to discontinue it, or some irresponsible party requested to stop it, we shall positively demand payment for the time it is sent. LOOK CAREFULLY AT THE LABEL ON YOUR PAPER.

## New Almaden Quicksilver.

J. B. RANDOL,

Room 22



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Are now so situated with their new works as to offer to the miners of the Pacific Coast small Air Compressing Plants at such prices that almost any small mine can afford to put in power drills if they have none in use.

By their new and patented systems (by which the duty or performance of drills is not reduced with use) it is no longer necessary to buy a Compressor of double capacity than the drills are expected to require, in order to keep up the supply of air necessary on account of the wear of drills and compressor.

Besides having the newest and lightest designed small drill plants, the Rand Drill Company, as is well known, has built, and is now building, the largest Compressor plants in this country, and has patterns for all sizes up to 40-inch diameter of cylinder.

In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

Since the reasons which formerly restrained them from the California market no longer exist, they are now in the field for the business.

SPECIAL ATTENTION is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.

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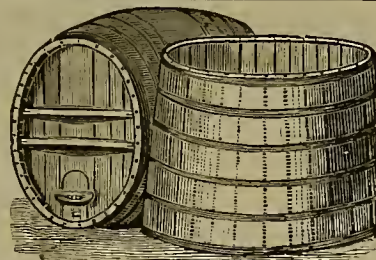
WORKS: California City, Marin Co., Cal.

ED. G. LUKENS, Manager.

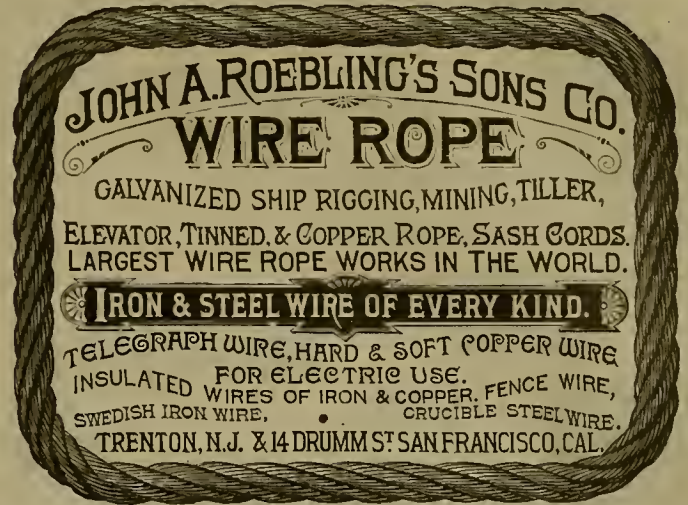
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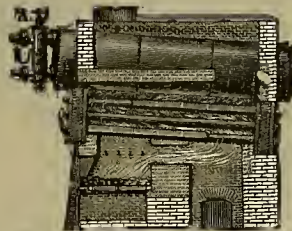
L. R. MEAD, Secretary.

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60,000 Horse Power now in use.

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STEAM ENGINES—Corliss, Slide-Valve, Poppet Valve Automatic, Single, and Compound.

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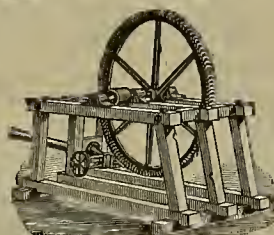
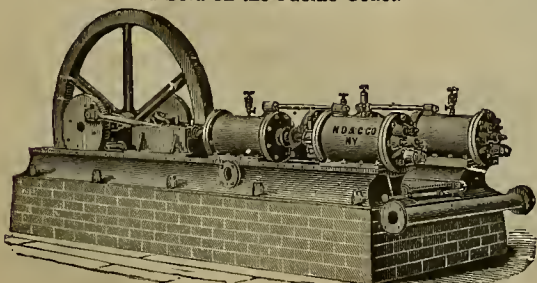
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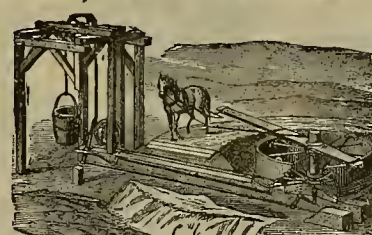
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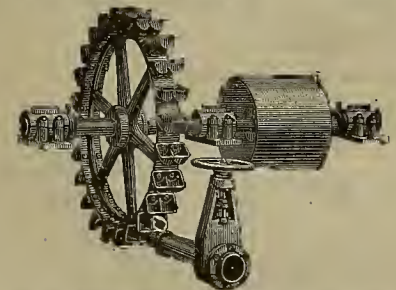


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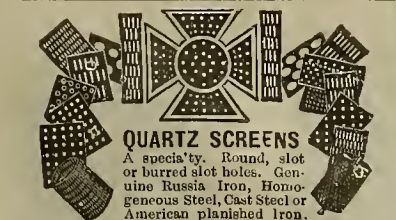
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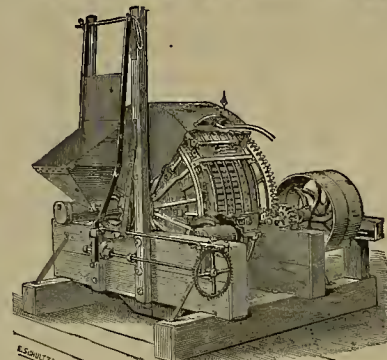
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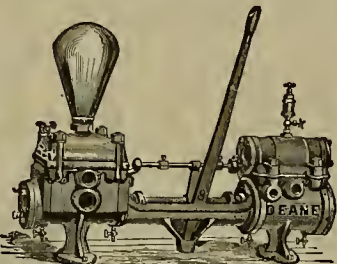
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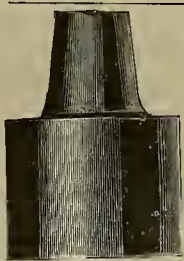
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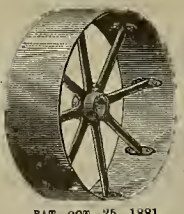
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2 Triumph Concentrators.

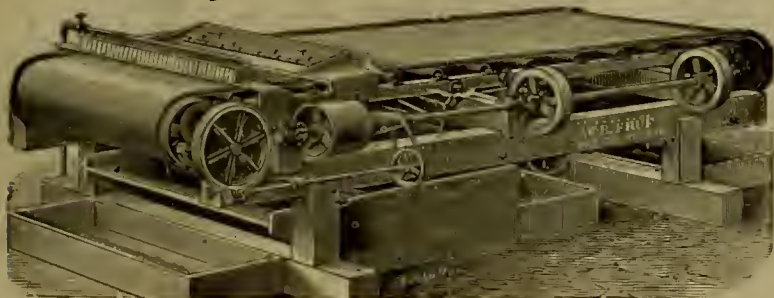
1 New 12-inch, 35 H. P. Engine.

VERY CHEAP. Apply

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**THE FRUE ORE CONCENTRATOR  
OR VANNING MACHINE.**

**PRICE: FIVE HUNDRED AND SEVENTY-FIVE DOLLARS  
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OVER 1400 ARE NOW IN USE. Concentrations are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

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DEAR SIR:—Having tested three of your Frue Vanners in a competitive trial with other similar machines (Triumph), we have satisfied ourselves of the superiority of your Vanners, as is evidenced by the fact of our having ordered twenty more of your machines for immediate delivery. Yours truly,

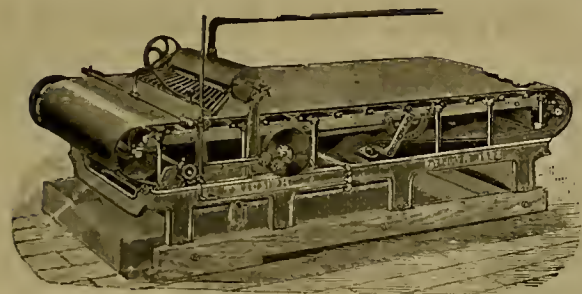
THE MONTANA COMPANY (Limited).

N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

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# \$1,000 CHALLENGE ACCEPTED, PRICE, FIVE HUNDRED AND FIFTY DOLLARS (\$550.00).



**THE  
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The present improved form of the celebrated "TRIUMPH" Ore Concentrator possesses many advantages over any other style of Vanners, Vanning Machines, or Concentrators, yet introduced to the notice of mining men. These advantages consist in the superior features which enter into their construction, and facilitate their operation.

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We have at hand many testimonials, from well known Superintendents of mines in different mining districts of the United States, bearing evidence of the efficiency and superiority of this form of Concentrator, and we shall be pleased to send Circulars covering such letters of testimony, and, as well, directions for setting up and operating these machines, and are ready to quote special prices for any considerable order.

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The Greatest Rock and Ore Crusher on Earth

— I S —

# THE GATES!

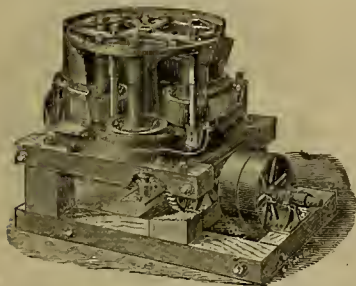
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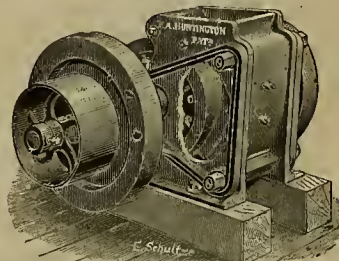
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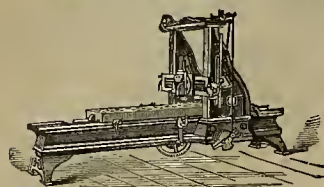
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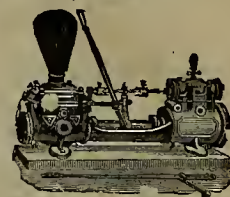


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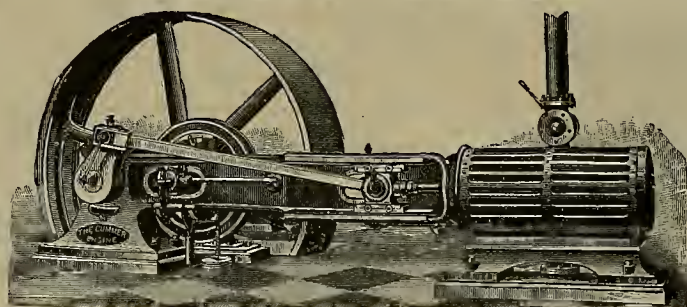
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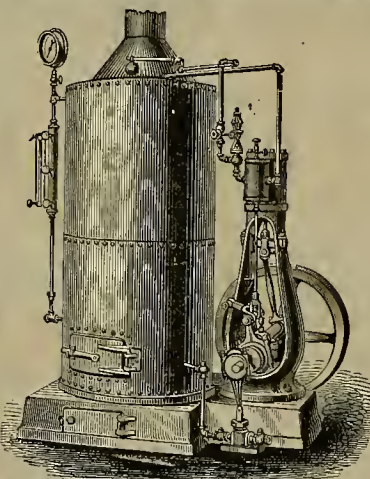
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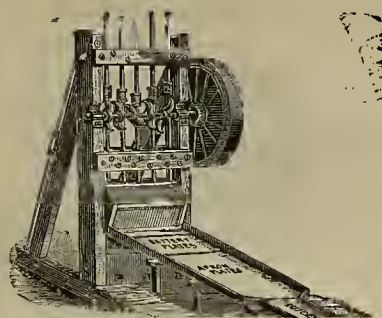
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An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MAY 19, 1888.

VOLUME LV.  
Number 20.

## The Nagle Engines and Boilers.

A number of forms of engine made in the East have been introduced on this coast within the past few years. One of the latest designs is the "T. M. Nagle," the agency of which has just been secured by Parke & Lacy of this city. These engines are built from entire new patterns with the latest improvements. There are several forms, one of which, the stationary boiler and detached engine, is shown in the cut on this page. This detached (center crank) engine is made in sizes from 6 to 15 horse power.

In all these engines special attention has been paid to make all parts plain, simple, strong and durable; all the wearing surfaces are unusually large. The material throughout is the best, and they are well made with the latest improved machinery, thereby assuring accuracy and durability. The frames are strong and well shaped. All the cylinders have hot air jackets which decrease the condensation in cylinder. The arrangement of the steam chest and steam ports is such that all the water forming in the cylinder is readily carried off, the ports extending below the bottom of cylinders, and the heaters being at all lower, a perfect drainage is secured; the heaters are independent of the frames, and all the pipes are easily accessible. The pumps are large and simple, firmly secured to cylinders and unable to get out of alignment; they are provided with large air-chambers and brass valves and seats, which can be readily taken out and replaced while the engine is working at full speed.

The center cranks are large and made of solid forging. The pistons are fitted with self-adjusting steam packing rings and do not require any attention, nor do they cut the cylinder. The connecting rods are of the most substantial character—of wrought iron, with straps, bolts and keys to take up the wear of the brass-boxes. The governor regulates the speed of the engine perfectly; they are provided with "speeders" to change the speed of engine while in motion, and also a hand-lever attachment to the valve, which is convenient for controlling the speed of engine when a uniform speed is not wanted, as when sawing, for instance. The general design of the engine is neat and compact.

The boilers for the portable engines are of the plain water-bottom furnace style, of the most approved proportions, and give the most general satisfaction; have large furnaces with removable fronts, giving easy access to fires, etc., for thorough cleaning and repairs; fusible plugs in crown sheets which will melt in case of low water in boiler and allow the steam to enter into furnace and put out the fire. The water bottoms admit of free circulation of water, and are a perfect safeguard against fire under the furnace and allow the sediment to settle below the line of the fire. Hand-holes are provided

in suitable places, in addition to the blow-off valve, to give easy access to the inside for cleaning. They are made of the best steel, and are tested at 150 pounds hydrostatic pressure.

As soon as the Chollar mill is again started up it will be by the old system of amalgamating. The tanks are all in place and will be ready to receive the ore pulp from the stamps as soon as crushing is resumed. The adoption of the tank system will admit of an increase of 50 tons daily above the amount of ore handled

**THE GUADALUPE MINE.**—In the action of the Santa Clara Mining Association of Baltimore against the Quicksilver Mining Company to recover possession of a portion of the Guadalupe mine, Judge Sawyer has filed a decree stipulated upon by the counsel engaged in the cause. Under this the complainant is awarded Lot 39, Township 8 south, Range 1 east, and Lot 40, Township 8 south, Range 1 west, Mount Diablo meridian, containing 1109.67 acres situated in Santa Clara county, and the defendant is forever enjoined from asserting any right to the

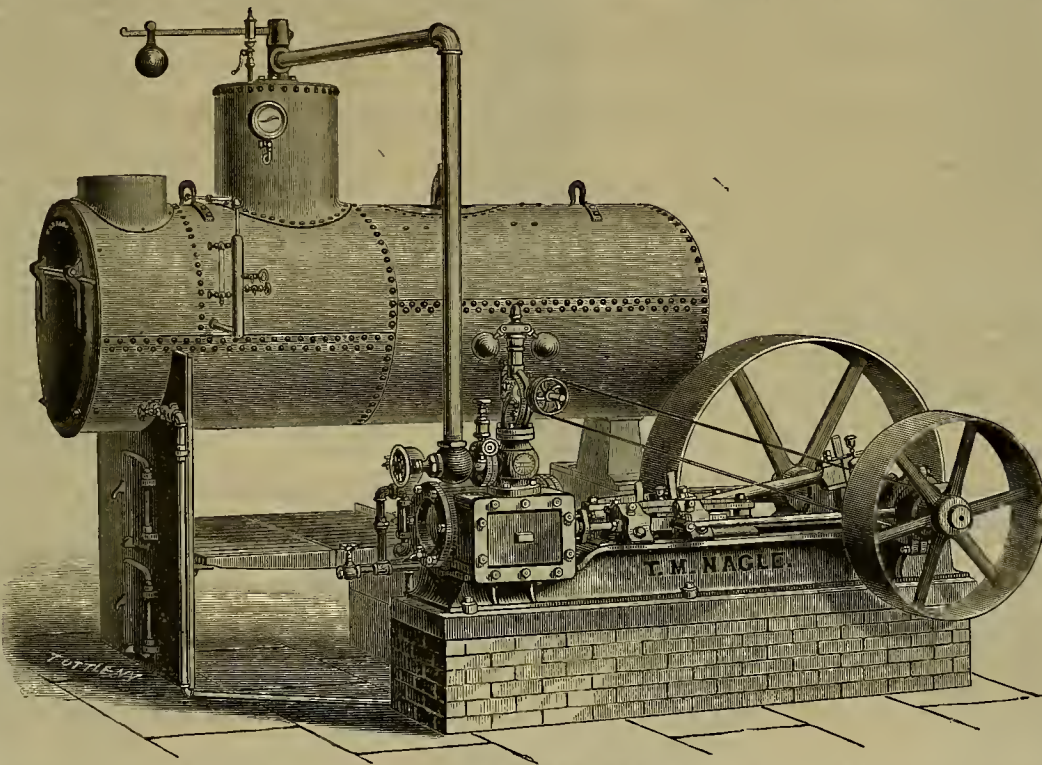
## Mining Stock Schemes.

It is strange that the promoters of mining schemes cannot see that it is their interest in the end, if not immediately, to give the capitalist a fair chance to multiply his investment many times in case of success, when he takes all the risk. Instead of doing this, an enormously inflated price is asked, and often obtained, with glowing representations. Phenomenal success must be had in order to even make good the price asked, let alone any profit.

It is this practice that has so disgusted the outside public with mining shares.

We have before us the prospectus of a company capitalized at 500,000 shares, and the promoters desire to dispose of enough "to develop the property"—a gold mine. No outfit is claimed and no equipment, but it is now a great producer. A portion of the stock is offered at the modest rate of \$1,000,000 to obtain money "to develop," or, in other words, to make the mine worth anything. The owners of this mine probably think they are a charitable institution to make such a liberal offer! It is dead sure to pay 25 per cent dividends when developed, they say. We would remind these promoters that stocks are selling on the board here every day at a rate that pays 5 to 8 per cent a month dividends, and the public don't bite very greedily.

Another scheme is before us from New York, a little more liberal. The property is in one of the old mining counties, with two shafts on it less than 100 feet deep. The ledge is 100 feet wide, and the ore as



STATIONARY BOILER AND DETACHED (CENTER-CRANK) ENGINE.

by the Logan process, and swell the monthly bullion product of the mill at least \$20,000 above the proceeds under that system of amalgamating. Iron pipe for leading the water down the shaft and incline to drive the dynamo for operating the mill by electric power is being delivered on the ground from the Combination shaft. The excavation of a station for the reception of the Pelton wheel and dynamo on the 1700 Soto Tunnel level of the Chollar main incline is being pushed to completion, and the five dynamo have been shipped from New York. The plant will be ready for a test run next July.

**A CHINESE PATENT SUIT.**—The only Chinese patent case ever brought in the courts was decided this week by Judge Sawyer. In 1885 Lam Tuck Chea obtained a patent for an improved Chinese lantern, which Fong Tang and Fong Mon Gip infringed. The injured Mongol immediately sought redress and prayed for the usual injunction and accounting, but Judge Sawyer refused to sanction the proceedings for want of novelty. In other words, the defendant showed that the principle involved in the invention was used in China and in this country long before the letters were issued. The bill was, therefore, dismissed.

land or bringing any action respecting it. The ownership of all other portions of the land which is known as the "Guadalupe Grant" is given to the respondent.

**MR. F. G. NEWLANDS** has told a reporter that it has been decided by D. O. Mills, himself and others who own the Carson & Colorado railroad, to extend that line from Keeler, on Owens lake, Inyo county, Cal., 100 miles to Mojave, connecting there with the Southern Pacific and Santa Fe systems. "The extension will open up to Nevada," said Mr. Newlands, "a large trade in lumber, ice, etc., in Southern California, and also give a market in Nevada for Southern California products."

One day last week a cave occurred in the Utica mine, Angela camp, on which occasion over 500 tons of material and debris came down. The coming of the cave being attended by the breaking of timbers and other warnings, the men employed in the mine succeeded in escaping without injury.

**DURING** the fiscal year ending February 20, 1888, the hullion-producing mines on the Comstock lode paid the Soto Tunnel Company a total of \$237,258.33 in royalties for ore extracted.

say—lots of assays but no mill runs—about \$50. The tenderfoot is given to understand that the whole ledge, for several thousand feet, is good for \$50, a veritable bonanza of copper, silver and gold. The public can have a slice of this at the rate of \$400,000 "to develop the property."

Comment is unnecessary. Mine-owners must remember that what works a mine is money. Prospects are plenty, and of little worth till shown up with capital, and it behooves mine or prospect owners to give capital the lion's share in their possibilities. Capitalists must be given an interest when they take the risks of developing a property, that they will get not a small percentage, but a multiplication of their investment in case of success, as failure means total loss.

It is useless to disguise the many contingencies of mining. While we deny it is a gamble, yet the public has come to think so by reason of taking shares in just such propositions that could work the investor any money, only in case of success as phenomenal and rare that few ever realize it.

**PROMINENT** men in the East express the opinion that the Coleman failure was due to an attempt to corner the horax market.



## CORRESPONDENCE.

We admit, unadvised, opinions of correspondents.—Eds.

## Boulder, Montana.

[From our Correspondent, R. G. HUSTON.]

My last communication brought me up to Wickes, and I see that unfortunately the notice of Montana Central tunnel became segregated in some way and tacked on the notice of Jay Gould district, when it should have come in under the head of Wickes.

Boulder City, the county-seat of Jefferson county, is 12 miles south of Wickes, and is now connected by railroad with the main North Pacific line by the Boulder valley branch, leaving the Wickes branch at Jefferson City, and climbing the range at the head of Prickly Pear creek and a short tunnel at the comb of the range. The elevation is reached by very heavy grades and a very crooked road leading in and out of the gulches and depressions in the mountain. To look down over it one would almost think it impossible; yet they have been operating successfully for the past six months.

The Montana Central have, it is reported, made arrangements to use this route until their tunnel is completed, which will be November at least, and they will iron their road, which is all graded and completed, to Butte via Boulder. This will give Butte another railroad, and will also give Boulder the advantage of a second railroad and connection with Butte. The North Pacific Boulder valley branch is completed and in running order to Calvins, 22 miles east of Butte, but owing to a pool complication with the Union Pacific, they were compelled to stop there indefinitely.

The Jefferson county people held an election to legalize their issuing bonds to build a courthouse, and it was carried by nearly 1000 majority. The cost of the courthouse and various other improvements in eight will approximate \$100,000 for the season for the county-seat.

## Mines in the Vicinity of Boulder.

The Amazon mine and smelter, some four miles north of town, have been operated by the Helena Mining and Reduction Co., and are now shut down; but a large amount of prospecting is going on here on the different properties. The Ella Co. are sinking their shaft deeper, and are doing no other work at present.

J. C. Sloss is operating a small force of men on the Bismarck, and Von Armin is running a tunnel to strike the ledge at some 200 feet below the old works. A large quantity of high-grade ore was mined and shipped from these two properties, before the railroad was completed, to Montana. If the ore chutes continue down, they will develop them, and with the present shipping and home reduction facilities good money can be made from these grades of ore.

## Elkhorn District.

Twelve miles east of Boulder, is an old producer, but during the first half of the past 12 months labored under great difficulties in her main stay, the A. M. Holter mine, for several months drowned out. Their old pumping plant was insufficient to handle the extraordinary amount of water of last season.

They are now permanently fixed for all occasions of this kind. J. W. Pender took charge of the mine last August, and was given carte blanche to place the mine in shape for mining, and he has faithfully fulfilled his trust, as the following will show: When he took charge there was 450 feet of water in the main working shaft or incline. Since that time he has cleared it of water, sunk the shaft 150 feet deeper, dressed out the shaft, which was in many places scarcely high enough to pass the car, and relaid the track with good heavy T rail. Before, only wood with strap iron was used, and the car was continually running off the track. He has run a 14-inch pump column to the bottom of the shaft, and is now busy cutting out a pump station 22x30 feet, for a large compound duplex double-acting Knowles pump. With this once in place, the water matter will be completely cared for. The ordinary pumping capacity of three pumps is 3,500,000 gallons daily, and double it if necessity requires. He constructed a skip for hoisting two cars from the incline, thus almost doubling their hoisting capacity.

Levels have been run east and west, winzes sunk and upraises made, thus developing more than 10,000 tons of ore. The mine is lighted throughout with incandescent lamps, and rapid progress is due in a large degree to the use of the Burleigh drills.

On the surface, almost as much progress has been made. Their machine shop has been fully equipped with the necessary improvements to enable them to carry on their own repairs without the delay of shipping to Helena. A new 60 inch White & Howell roasting furnace was added, the old one being about worn out, and too small to handle the increased amount of pulp.

Five stamps are being added to the plant, making it a 25-stamp mill, and in a short time the Elkhorn plant will be brought to the front as first class in every respect.

They ship some of their highest grade ore and have a drying and sorting house for this purpose. A new boiler is being put in, giving additional power enough to run the whole concern with ease. C. L. Vanter is still the general manager of the Elkhorn Co., and the hus-

ness affairs are running along in their usual quiet, unassuming manner.

The company deducts a hospital fee from all employees, and Dr. W. H. Dudley looks after them when his services are needed.

The company guarantees all board bills, and consequently there are no grumbling boarding-house keepers. I must confess I think it is the proper thing that a man working and receiving miners' wages should be compelled in some way to pay for what he consumes in the way of food before he blows his coin in on whisky, as is many times the case.

The J. R. Keene was owned when I was here before by Messrs. Nicholson and Jemison, and was then considered a very flattering prospect. Since that time it has been incorporated with 100,000 shares of \$5 each. Development have been continued and a number of carloads of ore shipped with good results.

Their main shaft is down 350 feet, and several hundred feet of levels run with satisfactory evidence of the pay continuing down. Some very rich ore was opened up a few days ago. There seems to be no reasonable doubt of the J. R. Keene becoming a regular bullion-producer in the near future.

## The Union.

Located one mile north of the Holter mine, is stocked for \$750,000. It is developed by a tunnel 300 feet, run on the ledge; vein from 2½ to 3 feet in width. The end of the tunnel is about 100 feet in depth from the surface. The company shipped three carloads of ore which averaged over \$100 per ton. This was shipped from the dump from a tunnel without any stoping.

## The Dunstan.

Located a short distance north of the Holter mine, and also stocked for a million, is developed by shafts. The deepest—50 feet—shows a ledge of about three feet of ore. One ton of first-class ore sampled over \$150, and second class from \$30 to \$40.

## The Paymaster

Is an extension of the Dunstan, and very much the same character of ore has been found. But little work has been done.

## The Luxembourg

Is a patented claim. Shaft down 60 feet, and are carrying copper, silver and gold was struck. Is not doing anything at present.

## The C and D.

Owned by Messrs. Clarke, Toole & Woolston, is ½ miles northeast of the town. It is developed by tunnel 300 feet, and shaft down from tunnel 100 feet. Two other shafts are on the ledge. Crosscuts have been run in several places and show this to be one of the largest ledges in the section; over 30 feet in width of an ore body is a pretty strong vein. They built a 60-ton smelter here nearly two years ago, and have made several runs with it, but at present it is shut down. There is no doubt of the C and D proving a valuable property, but the lead percentage is pretty small, and the expense of getting in the proper fluxing by way of teams over a very rough road makes it come too high for any ordinary mine.

The Montana Central and North Pacific have each a line surveyed in here, and surely one or the other will be built and then smelting at the mine will be a possibility.

## The Relief

Is located a short distance from the town. It is a stock company with a capital of \$1,500,000. Shaft down 200 feet. Crosscutted at 100 feet, found 8 feet of ore, and many assays were made of over \$100 per ton. At the present writing, are crosscutting at the 200-foot level, but have not yet reached the vein.

## The Keystone.

North of the C and D, is another company with a half-million capital stock. The shaft on the vein is down 80 feet, and a tunnel 300 feet in length to tap the vein has not yet reached it. They have yet to run about 50 feet. This will drain it to a depth of 150 feet and will thoroughly develop the property. In the shaft they had five feet of ore with assays of 60 ounces silver and 30 to 40 per cent of lead.

## The Louise

Is another stock company. Their development are a shaft 200 feet deep and they are now crosscutting for the ledge; nothing known of the ore developed.

## Mountain View

Is owned by Messrs. Fuhrkins and Thompson. It is developed by two tunnels—one run on the lead 100 feet and another running to strike the ledge at a depth of 400 feet. A solid galena ore is found running from 40 to 50 ounces in silver and 40 per cent lead. This is a very flattering prospect.

## The Elkhorn Queen

Is still another stock company. They have a shaft down 200 feet, and where the ledge was crossed they found a very large body of low-grade concentrating ore, containing lead and silver.

## The Highland Mary

Is a new discovery by A. A. McMillan & Co. It runs high in gold. Assays have been made as high as \$275 per ton. The tunnel is in 90 feet and there is a promising outlook.

There are many others with more or less work done, but these comprise the most developed and the ones having the best outlook for the future. The town is but little improved from one year ago—two good general stores and three ordinary hotels and the usual number of saloons with which every mining camp is endowed.

## The Copper Product.

## The Annual Report of the United States Geological Survey.

The official report of the product of copper in the United States for the year 1887 was issued recently by the Division of Mining Statistics of the United States Geological Survey. It is presented by C. Kirchhoff, Jr., of that department, and contains some very interesting statistics, both of the production and consumption of copper during last year. Considerably over one-half of the world's copper is produced on this continent, namely, in the United States and Chili. The former, however, leads all other countries in this industry, the product having doubled during the past six years. If a proportionate rate of progress is maintained during the next few years the United States mines will turn out at least 100,000 tons annually, which will enable them practically to control the world's market.

The total production for 1887 is stated by Mr. Kirchhoff to have been 181,170,324 pounds, of which Michigan mines produced 75,471,890 pounds; Montana mines, 78,699,677 pounds; and Arizona mines, 17,720,462 pounds. From this statement it is seen that Michigan is no longer the leading copper-producing State. Montana has shot ahead by 3,000,000 pounds. The Lake Superior District of Michigan was for a quarter of a century the center of the interest, but the discovery of the great Anaconda mine in Montana has given the Territory pre-eminence. This mine has fair to become even more famous than the Calumet and Hecla of Michigan, which up to within a year has been known as the largest copper producer in America. Montana's rise to pre-eminence has been truly phenomenal. Six years ago that Territory was credited with an annual product of less than 1000 tons. The actual quantity for 1881 was 875 tons. The copper product of Montana for the past seven years has been as follows:

1881, tons.....	875	1885, tons.....	30,267
1882.....	4,014	1886.....	25,067
1883.....	11,011	1887.....	39,350
1884.....	19,238		

The world's product of copper for the eight years ending January 1, 1887, was as follows:

1870, tons.....	151,089	1883, tons.....	108,341
1880.....	154,068	1884.....	218,774
1881.....	163,030	1885.....	229,427
1882.....	181,438	1886.....	212,556

The official returns for 1887 have not been made public. The total may be approximately stated at 220,000 tons. The four heaviest producing sections of the world are Spain and Portugal, which turn out from 30,000 to 45,000 tons per annum; Chili, which turns out from 35,000 to 50,000 tons per annum, and the United States, whose yield has been more than trebled in the past decade, as the following table will show:

1879, tons.....	22,000	1883, tons.....	51,574
1879.....	23,350	1884.....	65,708
1880.....	25,010	1885.....	74,052
1881.....	35,850	1886.....	72,848
1882.....	40,465	1887.....	90,585

The average price of ingot copper at Eastern centers for the 10 years ending January 1, 1887, was as follows:

1877.....	18 50	1882.....	18.41
1878.....	16 42	1883.....	16.55
1879.....	17.35	1884.....	13.72
1880.....	20.15	1885.....	11.14
1881.....	13.27	1886.....	10.95

The highest price during the interval was 24½ cents, in 1880, and the lowest 10 cents, in 1886. The average for the first six months of 1887 was 10 87.

About July last, when the price of the metal in London had dropped to £38 10s., a syndicate was formed in France for the purpose of obtaining the control of the copper product of the world for a term of three years. Stocks in all the leading markets were bought up, as well as the bulk of all the supply expected for the next three years, and the price advanced to £80 and upward in London, with the corresponding equivalent in this country.

The organization which has taken hold of this movement is known as the Societe des Metaux. Though not entering the field until the latter part of 1887, it claims to have made a profit of 16,000,000 francs in 1887, against less than 2,000,000 francs in 1886. Its stock of copper at the close of 1887 was invoiced at £64 per ton, as compared with £39 18s. per ton at the close of 1886.

ELECTRIC MOTORS AND THE STEAM ENGINE. There are certain enthusiasts who do not hesitate to say that the motor of the future will be the electric motor, and that the use of motive power is to be almost indefinitely extended. But, with curious inconsistency, they assert, in the same breath, that the steam engine must go. Those who look a little deeper into cause and effect understand that if the wildest dreams of electric enthusiasts were instantly realized, so far as to use electric motors—if it were possible—wherever power is now furnished directly by steam engines, the world would be enormously short in steam engines, and steam engine building would be, for a time, by far the greatest business of the age. The power that does the work of the world by steam would be entirely inadequate if this power had to be furnished through the connecting link of electric motors, with the attendant waste of energy. The steam engine will stand at least until the dreams of those who hope to make electricity direct from coal assume tangible form, and even then there is great probability that it will continue to be

"the great prime mover." This is not saying that electric motors will not come to be used to a considerable extent, but steam engine builders can console themselves with the fact that every one substituted for steam direct will give them more instead of less work.—*American Machinist.*

## Shade Trees for California.

The public is indebted to the Sacramento Improvement Association for drawing out the observations of several experienced tree-growers of the capital city as to the adaptations of certain trees for planting in this State. Of course what is best for Sacramento is not necessarily best for some other parts of the State, but the remarks, which we shall reprint below from the report in the *Record-Union*, have a wide bearing.

## The State Gardener's Views.

David Meldrum, the State Gardener, who has charge of the beautiful grounds around the State Capitol building, said he had been requested to prepare a list of trees suitable for street and avenue planting. He favored ornamental evergreens. Of the evergreens the magnolia grandiflora was a very fine ornamental tree. The Italian holly had a very bright foliage, was a beautiful tree and had a fine shape. The Portugal laurel was most beautiful for street planting; it had a beautiful foliage, long chains of white flowers, pleasing to the eye, and very fragrant. The araucaria excelsa was one of the finest ornamental evergreen trees in California. It is a native of Norfolk island, Australasia. There are two other varieties of the araucaria, the Bidwillii and the imbricata, that are also handsome ornamental trees and would do well in the Sacramento climate. The Grevillea robusta is a most beautiful sidewalk tree. It grows rapidly, is palm-like in shape, and is one of the handsomest lawn trees that grows. It grows to a height of 50 or 60 feet, and is quite hardy. The American arbutus is a fine tree, there being some excellent specimens of this species in Capitol Park. The Siberian arbutus is also a fine tree. The Sequoia sempervirens, redwood, a native of California, the "big tree," is excellent for sidewalk planting and much admired by Eastern visitors. The Lawson cypress and the Monterey cypress are both excellent trees.

Regarding deciduous trees for lawn or sidewalk planting, my observation is that there are a half dozen or more varieties that are suitable. The white elm (*Ulmus americana*) and the cork elm, are both good. The Oregon maple is a fine tree, as is also the Norway maple. The latter grows well in Sonoma county. The tulip tree is a fine grower, has a smooth bark, and bears most beautiful flowers, and for an ornamental tree has few superiors. The Eastern yellow poplar and sugar maple do not do very well here. I would not recommend those or any other species that I am not acquainted with. The cost of these trees varies all the way from 50 cents to \$10 each.

## Views of a Practical Florist.

F. A. Ehel, the well-known florist and nurseryman, was next called upon. He said in selecting deciduous shade trees he would by all means recommend the cork elm, as it makes the best and most symmetrical tree, is entirely free of insects and requires less care than any other large-growing tree. The horse-chestnut is a fine growing tree and no pruning is required. Then the European linden (*Tilia grandiflora*) requires, perhaps, a little more care in the beginning, but which amply repays by its beautiful foliage and fragrant blossoms in the early summer. The Norway, silver-leaved, sugar and variegated maple is also fine for shade trees. The tulip tree (not much known in this part of the country) is a beautiful, even-shaped tree, and requires no trimming whatever. Its beautiful flowers are produced on the tip end of the branches and resemble the tulip, from which the tree derives its name. I saw 50 or more of these trees, all of the same height, surrounding a small lake in central Germany (Hesse Cassel) and never have seen a prettier sight. Then we have the ash, beech, hick, China umbrella and other trees well adapted for this section.

Of evergreen trees he would recommend the magnolia grandiflora, familiar to everybody. Grevillea robusta, pepper tree, several species of acacia, also laurels, pittosporum, palms, pichardia filamentos, chamærope excelsa, phoenix canariensis and dactylifera, all of which, with proper planting and a little care in the start, will make a showy sight, especially if deciduous trees are planted alternately with the evergreen. In his opinion the deciduous tree, during the winter, when it is without foliage, is still a protector to the more delicate evergreen thus planted with it. The trees so planted should have plenty of room, and by the time the evergreen is large enough, the deciduous trees may be disposed of altogether.

As for mode of planting, a large hole should be dug for all trees; the top, or better soil, should be thrown into the bottom of the hole, and, if necessary, should be filled entirely with new soil. The cost of doing so will amply repay in the growth of the trees. With evergreen trees persons should take good care that trees are not stunted or pot-bound, as it will take a long time for them to get over it; in fact, healthy trees should always be selected, and the best way to accomplish this, none but an experienced person should be trusted with selecting them.

It is rather a difficult matter for me to speak



of, as to give any rule or regulation for pruning is almost impossible. Different trees will need different treatment, and if people in general will employ none but skilled hands to do it, there is very little danger that a tree will be ruined by pruning. The greatest trouble is that most people are the best pleased with the man who cuts off the most branches, they not knowing themselves what is right in regard to pruning trees. A close observer will find throughout the city that the most trees are spoiled by too much pruning. For example, a cork elm should be trimmed and shaped in the first and second years after planting. When that is done properly, the tree will take care of itself better. A person that knows nothing about pruning will spoil more in one hour than the tree will make good in five or ten years.

#### Mr. Williams's Views.

Robert Williamson, the well known nurseryman, and a member of W. R. Strong & Co., next added his views. He said he had been highly entertained with the remarks of those that preceded him. Their views were excellent, their selections admirable and their suggestions good. He said of all deciduous trees, however, he thought the cork elm the finest. It was a strong grower, symmetrical and uniform in its habits. The American elm was not uniform in its habits; one would be weeping, another upright and another straggling. He grew the cork elm from cuttings, and got uniform trees in every instance. The silver maple he regarded as a very fine tree. It had a uniform habit, and that was the beauty of a street or avenue, to have it all look alike. This committee, of course, cannot dictate what kind of trees shall be planted, and there will be as many varieties as tastes in the same block. What we should endeavor to do is to

#### Educate the People

Up to the fact that the best should be adopted, and then all on the same street plant that and none other. The Carolina poplar would do well in the lower or southern portions of the city. The handsomest tree in the city to-day is the China umbrella trees in Add C. Hinkson's yard, at Twenty-third and H streets. There is no trimming to be done; all you have to do is to get it up. The prettiest avenue I ever saw was one shaded with umbrella trees. If the tree is ten feet high, then it is ten feet across; if 20 feet high, then 20 feet across, and a perfect umbrella. It has a dense green foliage. If you want to make selections of evergreen trees, you must take the character of the soil into consideration. The excelsa araucaria wants a moist climate, but the Bidwellii will do well in this section. The Monterey cypress is a good tree, is cheap and can be obtained almost anywhere. The Monterey pine is another cheap tree, and will grow almost anywhere. The Greveillea robusta won't stand a cold snap or heavy wind. The sugar maple is a slow grower and is a failure here. The tulip tree grows slowly here, and not so luxuriantly as in Germany. The magnolia grandiflora may stand at the head of the list, as Mr. Meldrum says, but it is a slow grower and a very expensive tree. A tree from two to four feet high costs all the way from \$1 to \$2.50.

There is a tree that has been suggested to me by Mr. Gillet of Florida, and that is the wild orange. It is a beautiful tree, a rapid grower, hardy, and will stand more frost than the sweet orange, the fruit hanging on the tree for several months after it is ripe. The small boy will let them alone, for if he tastes one once he will never do so again. The fruit is large, and finer looking, if anything, than the cultivated varieties. Those who want a good cheap tree can do no better than plant cork, maples or palms. The California palm is the best, because it is hardy and a rapid grower. The suggestion of Mr. Ebel to alternate the deciduous trees with evergreens, is an excellent one.

The Florida orange, in my opinion, is the best tree we can possibly get. We can club together, get some of these colonies to go in with us, and get out a carload of 5000 or 6000 trees. I would like to see our streets set out with wild orange trees. In Jacksonville and other cities in Florida they have no other shade or ornamental trees, and the sight is truly beautiful, and if we had it here the sight would simply paralyze the Eastern visitor. They require no more, in fact not so much water, as other trees.

The blackwood acacia is a fine tree, as are also some of the pepper varieties, and they will do well in the eastern suburbs.

Mr. Williamson was asked how large the wild orange tree grew, and he replied those on the public streets in Jacksonville were 40 and 50 feet in height, of fine symmetry, never required any pruning, and no care. Their foliage is a dark green. The speaker gave some general views on tree-planting and pruning. He said Sacramento had a number of wood hutchers going around town hacking trees to pieces. They added nothing to the beauty of the trees, and did much to injure them.

#### A Weather Expert's Opinion.

Samuel Gerriah, a gentleman who has always taken a great interest in the cultivation of semi-tropical plants, was next called upon. He said: "The beauty of any city that makes pretensions to a semi-tropical climate is in its verdure in the winter season. If the trees that will grow equally well in a more northern climate are largely planted, they will present an uninviting aspect to tourists from cold climates. Therefore it is better for us to plant those trees that retain their green foliage during the en-

tire year. If one were to be taken to the State Capitol building and look over the city, he would see very little verdure on the trees. It presents a true winter aspect—trees with naked branches everywhere. It is true these trees are fine in summer, but in the coldest climate they are the same. If we boast of a semi-tropical climate, let us show travelers that we also grow semi-tropical trees.

"The habit of tree-trimmers and gardeners of treating semi-tropical evergreen trees as they would hardy deciduous trees is suicidal, for many of them have been killed by this method. Orange, eucalyptus, olive and all trees of their tender nature should be pruned in the spring, and not in the fall, to suffer from the cold and set back if not ruined. The olive tree is not a slow grower, as compared to the orange, is very hardy, and for a shade tree in the city is beyond question desirable, as it will root well and stand the winds. The magnolia grandiflora is also one of the very best. These three va-

#### The Southern Pacific Railroad.

There is much of public interest in the report of the Board of Directors of the Southern Pacific Company for the year ended December 31, 1887, just issued. During that period the company operated 5576.04 miles of road, of which 3888.88 belonged to the Pacific system and 1687.16 to the Atlantic system. The gross earnings for the year were \$37,930,161.51; operating expenses, \$22,712,198.32; earnings above operating expenses, \$15,217,963.25; rentals received, \$574,691.12; total surplus, \$15,792,654.37; rentals paid, \$1,911,650.56; taxes, \$1,022,263.41; balance surplus, \$12,858,750.40. Adding to this surplus \$652,943.95 interest and income, a grand total of \$13,511,594.35 is reached. Out of this was paid the interest on the bonded debt, \$9,364,503.82; \$1,200,000 to

#### Cables and Electricity.

C. B. Holmes, President of the Chicago City Railway Co., writes as follows to the *Street Railway Journal*:

But when all other points have been covered, there still remains that of economy, which must always be paramount and final. A motor may be sure, swift and good, but unless it can be operated with economy, it is as valueless for practical purposes as though it had never existed. And this is a condition in which the great public is even more vitally interested than corporations or stockholders. No company can carry people at a loss, hence that system which can transport the passenger at half the cost of horse-power, can better afford to carry him twice the first distances by the cheaper motor. And this is precisely what the cable does. For months past the cable in Chicago has been carrying thousands daily eight miles for five cents. Where is the electric motor that has ever attempted it? Eight miles for five cents is just half the sum for which the service could be performed by horses on this line for years previous. These eight miles are made in 40 minutes, including just as many stops as the riding public may desire, to take on and discharge passengers.

In these days of intelligence a truly meritorious and economical motor will force itself to adoption and use, whether liked or disliked by its adopters, just as surely as oil rises and floats upon the water. It is not a question of choice, it is a matter of necessity.

When an electric motor will draw trains of three or four cars, carrying 200 people, at intervals of 40 seconds, for 15 hours in the day, year in and year out, starting from the very heart of the city, and ending away out in the country, in heat or cold, wet or dry, snow or dust, for 11½ cents per car per mile, at the rate of 10 to 14 miles per hour, then, and not till then, can it ever claim to equal or approach the cable-system as a motive power.

Do you know that after all this hue and cry about electricity only four cars operated by the storage battery system have actually been contracted for by the street railway companies of this country up to the present time? All the electric cars in actual service in America to-day are operated either by the overhead wire or the third-rail system.—Col. H. M. Watson, President Buffalo St. Railway.

I FOUND that the cable roads in San Francisco ran with admirable regularity and with satisfaction to every one. The cable lines there are conducted under far greater difficulties than in St. Louis, but on the coast the roads have all had their trials and are thoroughly broken in. One cable line is 15 years old.—President Julius S. Walsh.

It has been demonstrated that a speed of eight miles an hour can be safely and satisfactorily maintained through crowded thoroughfares by the use of the cable system.

#### A Monument to Audubon.

The Linnæan Society of New York asks contributions to assist erecting a monument to mark the resting place of John James Audubon in Trinity cemetery, New York City. The movement originated with the Academy of Sciences of that city and, we are told, has been met with much favor. The presenting of the enterprise for the favor and support of the public, has been confided to the committee appointed from the Linnæan Society of New York, who now issue their appeal.

We are largely indebted to Audubon for the present lofty standard of American natural history, his name has given inspiration to many, and the grandeur of his achievements in this department of science has produced a line of successors of which America is, and may well be, proud. Genius knows no national bounds, great men are cosmopolitan; in honoring Audubon, the American-Frenchman, the hunter-naturalist, the artist-ornithologist, the indefatigable and ardent lover of nature and depicor of her manifold beauties, we feel that all the world will heartily commend the project and rejoice at its successful conclusion.

The engraving on this page represents the proposed monument, which it will be seen calls to mind the leading features of Audubon's life-work. We have thought that there might be many on this coast who would like to share in the effort to signify the popular appreciation of the distinguished naturalist and his work. Contributions may be sent to L. S. Foster, Chairman of the Committee, care of Linnæan Society of New York, 11 West Twenty-ninth street, New York city. We are assured that a prompt acknowledgment of receipt of contributions will be made.

LARGE BRASS DRAWINGS.—One of the new elements of construction rendered necessary by the invention of the dynamite gun by Capt. Zilinski, has been the need of a brass shell for the projectile. A firm in Waterbury, Conn., have succeeded in making shells of seamless drawn brass, with conical head 3-16 inch in thickness, and weighing 200 pounds. Their length is 6 feet 8 inches, and inside diameter 14 inches, the whole being in one piece produced by the cold flow of the metal drawn into shape with the hydraulic ram. This shell is designed for the purpose of carrying 600 pounds of explosive gelatine, as a charge for Capt. Zilinski's dynamite guns.



DESIGN OF PROPOSED MONUMENT TO AUDUBON.

eties are suitable for a moist, sandy or any kind of soil, but require water. The fan palm tree (*Chamerops excelsa*) is the most hardy of all palms; never had a leaf touched by frost in this city; grows rapidly, attains a height of 40 feet, and is elegant for a sidewalk tree. There are many others that would add to the beauty of the city. The pepper tree does well if planted where it can root in a stiff, dry soil, but is not free for our wet seasons here, as it will not root, and blows down in any high wind.

"The 30 varieties of eucalyptus should furnish many specimens of this beautiful tree to decorate our streets. Let us by all means study this question and urge all our citizens to adopt the methods of our Southern brethren, and make our city smile in winter."

CAMEL'S HAIR BELTING.—According to experiments recently made at the Royal Polytechnic School at Munich, the strength of camel's hair belting reaches 6315 pounds per square inch, while that of ordinary belting ranges between 2230 and 5260 pounds per square inch. The camel's hair belt is said to work smoothly and well, and it is unaffected by acids.

THERE is no apparatus for the transformation of energy that compares in simplicity and efficiency with the dynamo-electric machine and electric motor.—*Science*.

the Central Pacific for rentals; betterments and additions to leased property, net, \$487,682.90; profit due lines under lease, net, \$417,274.50. The grand total of expenditures thus runs up to \$12,476,734.39, leaving a net surplus over all of \$1,034,959.56. The increase in gross earnings over that of 1886 was \$6,132,279.55. The net profit of the Central Pacific under the lease for 1886 was \$1,324,998.31, as against \$1,086,733.31 for the year 1887, a decrease of over \$200,000. The net profit for 1887 was \$113,266.69 less than the annual rental, and this deficit is payable by the Southern Pacific Co. In General Manager Towne's report it is stated that in 1887 there were carried by the system 7,846,203,090 pounds of freight, an increase of 11.01 per cent over the previous year. There were carried 10,163,462 passengers, against 9,174,010 in 1886. The increase in local travel was 20.02 per cent, and in ferry travel 5.94 per cent.

Mr. Towne concludes his report with the following language:

"In no period of the history of our roads or of the country has there been a time when so much might truthfully be said of this great State. California's prosperity is doubly assured, and rests upon a solid and enduring foundation. Her products find ready market in all parts of the world, and the development of commerce, agriculture and other industries has but just commenced."





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SAN FRANCISCO

Saturday Morning, May 19, 1888.

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## Business Announcements.

[NEW THIS ISSUE.]

Meeting Notice—Alabama Mining Company.

Delinquent Notice—Butte Creek Mining Co.

See Advertising Columns.

## Passing Events.

Silver has been gradually going backward in value until this week it is 92 for pure silver or 82.8 for the mint standard of 900 fine. It has never been lower than this but once, and that was two years ago. The present figures are very unsatisfactory to producers of silver bullion.

The building of a railroad to the big copper mines at Bisbee, Arizona, now resolved on, is a great thing for that section of the country. These mines are very productive, and with railroad facilities for coke, supplies, and bullion, will do much better in the future.

The Comstock bullion production for the first quarter of the year, as figured up by the assessor, is very satisfactory, being ahead of the corresponding period of last year. It is, moreover, gradually but steadily increasing.

There is no news of moment from the Lower California gold-fields. An impression prevails that the excitement was one more or less connected with a sort of "land boom."

For the first quarter of this year the Comstock mines have produced about \$1,500,000. The average of 71,504 tons of ore was \$19.75.

## Bullion vs. Copper and Lead.

The practice that on this coast has come to obtain of including copper and lead in our annual product of bullion is one that ought to meet with early amendment, and that for a variety of reasons: In the first place, it is a contradiction in terms, bullion consisting of only uncoined gold or silver, neither copper nor lead can form any part of it. The statement that the country produced last year bullion to the value of \$104,000,000, of which \$20,000,000 was composed of copper and lead, is as if the Census Marshal should say California contains a population of 1,400,000 souls, divided as follows: 900,000 whites; 20,000 colored people; 160,000 horses; 5000 jackasses; 140,000 Chinamen and 175,000 sheep. Having included copper and lead in his schedule, wherefore does the bullion statistician leave out coal and chrome? For the reason we suppose that the census man might leave out from his enumeration the cats and dogs.

This practice, now so culpable and absurd, was in its inception simple and excusable enough, having originated in the early days of mining, when there was so little lead and copper produced that they did not require to be eliminated from the bullion product of the country. Gradually, as operations were extended to silver mining, the output of these base metals increased, having reached its present large proportions without any one protesting against these metals continuing to be accounted bullion for the reason seemingly that there was no one sufficiently interested to make a movement toward that end.

Although large quantities of copper ore were taken out at the Copperopolis mines in California between the years 1866-8, the product of these mines did not figure in the bullion returns of the State, having been shipped abroad in the form of ore. Meantime considerable lead began to be produced in this State; but it was parted from the silver and other metals with which it was combined and afterward sold as lead, never appearing here as bullion.

In most other sections of our mineral regions, however, a different rule has prevailed, the lead and copper produced to the amount of several hundred millions, having there been returned as bullion; to such large extent has this class of data been in error and so far as depended upon misleading. And this evil, if left to itself, instead of abating will increase with lapse of time, as the product of these metals throughout the above countries will be likely to undergo considerable increment hereafter. It looks now as if their value might be doubled within the next decade, increasing by this process of misnomer our bullion product in the same ratio.

As is well known, statistics of this kind can, with our best efforts, be made no more than approximately correct. What sense is there then in willfully introducing into them such an element of error as this? seeing it must greatly impair their value as the basis of any important estimates or calculations, legislative, fiscal, or otherwise. Assuming these returns to be accurate, or nearly so, the political economist, the publicist, and others having occasion to consult them, act accordingly. How worse than useless they become when out of the way to the extent of one-fourth the actual bullion production made must be obvious to all. How can any satisfactory conclusion be reached discussing the question of monometallism for instance, on the assumption that we produce annually a hundred million dollars worth of bullion when the product amounts to but eighty millions? The premises being unsound, the deductions made from them must be equally faulty.

Another objection to this method of computing the bullion product is that it works to the prejudice of California, Oregon and such other sections of the coast as make little or no lead or copper, their bullion consisting mainly of gold and silver—in other words, their bullion is bullion. In reporting it no attempt is made at exaggerating its value through any misstatement of facts or perversion of language. In the tabulated statements as they appear from year to year, California has of late been relegated to a secondary place as a bullion-producer, when as a matter of fact she is entitled to the first place.

If the value or quantity of mineral products made is, without reference to kind, to settle the question of supremacy in this respect, it must be awarded to Pennsylvania, which pro-

duces more coal, iron and petroleum than any other State in the Union. As a producer of the precious metals, however, California heads the list, having for the past few years been outranked through the process mentioned.

## Quicksilver and the Tariff.

We recently published the petition to Congress of the quicksilver miners of California, asking that body not to remove the duty on the article. American quicksilver is solely mined and manufactured in California, not being produced anywhere else on this continent. The present duty is 10 per cent ad valorem. The proposed changes in the tariff include it in the free list, against which the quicksilver producers protest.

It seems now that the Eastern manufacturers are trying to get quicksilver on the free list, while they at the same time keep their manufactures protected.

The following is a list of the articles manufactured from quicksilver in the East, but not in California:

Bisulphate of mercury, yellow.	
Cyanide " " green.	
Iodide " " red.	
Nitrate solution of mercury.	
Oxide " " black.	
Oxide " " yellow.	
Photo-bromide " " yellow.	
Sulphate " " black.	
Sulphuret " " with chalk.	
Mercurial ointment.	
Mercurial preparations.	
Vermilion.	

Duty  
25 per cent  
ad valorem.

Here are these Eastern manufacturers protected by a duty of 25 per cent ad valorem, trying to get a ten per cent duty taken off the substance which forms the base of their products. They must buy this base in order to make the product. They would sacrifice the quicksilver mining industry of this State to benefit themselves, regardless of the fact that our mines are owned by individual citizens, while the foreign mines are owned by Governments. The Austrian and Spanish quicksilver miners are paid very low wages, and the mines are so immense that they can largely increase production and flood our markets if they desire. They could put prices down so in a few years that our California mines would have to be closed down, and then, when they had a monopoly, they would advance prices so largely as to make up for the period of depression.

## Watching the Hydraulic Miners.

The supervisors of Yuba county are said to be considering the expediency of supplementing the present reward plan for the detection of illegal hydraulic mining by the employment of ten special detectives for that service.

Although the hydraulic mines that have been enjoined from running are quite numerous, the territory they occupy is not so extensive but what the sight of every one of them ought to be well known to most residents of Yuba county. We fancy we could, as we sit here writing, give the name and the locality of nearly every property that has been placed under the judicial ban.

A hydraulic mine, when in full operation, is rather a conspicuous and noisy object, being able to make itself seen and heard for a considerable distance. It cannot be run, as this proposition for the employment of so many detectives would seem to imply, in a secret and silent manner. Raising a great column of water on high, and dashing it with terrific force against a solid bank of earth 300 or 400 feet away, its operations can, under favorable circumstances, be seen and heard for the distance of a mile or more. When running, the whole neighborhood is advised of the fact.

Not only so, but the residents along the out-letting streams, for a long way below, know by the discoloration of the water that gravel-washing by this process is going on somewhere above. The moment the hydraulic miner commences his work, he advertises the fact to everybody below. Plot and scheme as he may, he cannot conceal what is going on. A hydraulic pipe and nozzle is a very different thing from the ordinary garden hose. It is larger and much more powerful. The dishonest miner cannot carry this apparatus into his cabin and run it there with impunity; nor, stowing it away under his bunk, can he take it out of a night and operate it safely under cover of dark-

ness. This never has, and never can be done. The thing is impracticable.

For our part, we supposed hydraulic gravel-washing had entirely ceased throughout the enjoined districts, having been led to such conclusion from announcements made in the Marysville and other valley papers to that effect. Repeatedly during the past year have we seen it stated in these papers that the water of the Yuba was at last running clear, and that the navigation of both the Sacramento and the Feather rivers has been greatly improved since the hydraulic mines were shut down. We are, therefore, not a little surprised now at this talk about employing so large a force to patrol the mines and report what is being done by the malcontents who were thought to have been so effectually stopped.

## Pioneer Mining Companies.

In the early days of mining in California, companies were formed to go to the gold-fields, which were very different from the companies formed for mining purposes now. Then the men were banded together for mutual protection and profit, and the individuals of the company went to work with pick, pan and shovel. Now the members of the company own stock and hire others to work the claim that they buy. There are thousands of people who own mining stock who never saw a mine and never want to. The pioneer companies were often formed in the East before starting for this State, others were organized on shipboard on the way here, and still others were not formed until the mines were reached. These pioneer organizations seldom had names such as modern corporations have. They were formed for no definite period, and it was a simple matter to dissolve partnership and "go it alone." They left no records, having kept none, and as few of them lasted any length of time, their histories have never been written.

Even to this day, however, inquiries are often made concerning these wandering parties of miners or of individuals connected with them. A letter received by the PRESS this week is in point, and is as follows:

EDITORS PRESS:—In the year 1851 a party of men left Philadelphia, Pa., for California; their object in view was gold mining in that State. The men reached California, and I received letters soon after from a relative who was among them, but through change of address received no more, and have not heard from him since. I would like to know his whereabouts, having lost his letters. I do not know what part of California the company made their destination, so I have no guide to search by. Could you possibly inform me where the company mined on reaching California, or if not, can you direct me to any person who is likely to know? Any information will be gratefully received. You will oblige me very much by sending an answer.

FRANK J. LINDHEIMER.

Cape May City, N. J., May 9th.

How our correspondent ever expected to get any information on the subject that interests him we do not know. He does not even give the name of the person of whom he inquires. He does not state what time of year the party left, or whether they came here by way of Panama, Cape Horn or across the plains, or even the name of any one of the number. This is a sample of one kind of letter sent to newspaper offices, and the writers wonder why they are not answered, although no return stamp is inclosed.

The letter is here published only to call attention to the vague inquiries now made concerning our pioneer miners. Few persons in the East have any idea of the magnitude of the State of California. Its area is 156,591 square miles, or 100,218,560 acres, or if we count the rivers and creeks, lakes, ocean shore-line, etc., the true area is 162,197 square miles. The State is about 750 miles long, and an average of 240 miles wide. Gold mining is carried on at the extreme north and at the extreme south and at various places between these points. In the early days the mining-field was mainly in Central and Northern California, but even then the field was large. "Looking for a needle in a haystack" is a small task compared to hunting up and tracing out, at this day, the history of the companies of pioneer miners who dug for gold in "the days of '49."

THE Silver State is informed that a new company has been organized to work the Cottonwood nickel and cobalt mines. Reduction works are to be built on the ground, and representatives of the company were expected at Lovelock yesterday to go to the mines to commence work.



### Hydraulic Gravel Elevators.

Perhaps no other mining appliance is now attracting so much attention in this State as the hydraulic gravel elevator. Before the general stoppage of hydraulic mining, the use of this machine was mainly confined to "low ground," and was used to lift gravel to a point where fall could be obtained to carry off the washed material. When, however, miners could no longer operate their gravel claims by the method formerly employed, the elevator was brought to notice as an appliance by which the claims could be worked. Since then it has been introduced in many places. By its use the gravel can be elevated and the debris carried into old workings, pits or valleys, so that the heavy material will be prevented from going with the rivers or creeks, and making the claim-owner liable to injunction. When the machine was first introduced, there were doubts as to its efficiency, and it was thought to be adapted only to very low lifts. It has since been made to elevate the gravel as high as 80 feet. It was thought, also, that it would rapidly wear out and be expensive to maintain.

We print an extract from a letter, giving some facts in this connection which will be of interest to owners of gravel claims. It was written to the manufacturers of the elevators by R. H. Campbell of Etna, Siskiyou county, and is as follows:

"I am glad to inform you that I am greatly pleased with the hydraulic gravel elevator furnished for my use by you in October, 1886. It has been running day and night since the 10th day of February of this year, with only a few stoppages of less than a day at a time, which were not due to any fault of the elevator.

"There has not been one dollar's expense or breakage to it, and the wear seems to be of no consequence. My foreman says the throat will last another season, but if one throat will last one season's run of four or five months, I shall be perfectly satisfied. I expect to run with a full head for a month or six weeks yet, when I propose to lower the elevator 14 or 15 feet, making in all a raise of 40 feet, under a pressure of 240 feet, with a volume of 1000 miner's inches of water conducted through a 22-inch pipe laid straight down the hill to the elevator."

The No. 3 20-inch hydraulic gravel elevator referred to above was purchased from the Joshua Hendy machine works in this city in October, 1886, by Mr. R. H. Campbell, manager of the Quartz Valley Mining and Stook Raising Co., owners of an extensive and valuable hydraulic placer-mining property, situated near Etna, Siskiyou county, this State. The elevator was placed in position and operation in April, 1887, and at the close of the mining season of that year Mr. Campbell wrote to the manufacturers "that it had performed all of the work required of it, and that the wear of its parts was simply nominal."

The favorable report presented by Mr. Campbell of the operations of the elevator thus far in this season confirms that of last year, and is worthy the attention of mining men who are or contemplate becoming interested in hydraulic mining enterprises by the method known as the hydraulic gravel elevator system.

As many persons have claimed where this elevator may be used, there may be some who are not familiar with its details of construction. The cut on this page is a sectional view of an elevator in operation.

The open end of the ground section is concave in shape, or there is a lower half-section of pipe flaring outward, into which the earth, sand, gravel, etc., are sluiced by hydraulic giants through bedrock flumes leading thereto. The elevator entrance and throat sections are set in a chamber excavated below the bedrock surface.

The material sluiced into this entrance is

taken up by the steam issuing from the fixed hydraulic nozzle, which, by its impinging force, impels it forward and upward through the pipe to its point of discharge in the open frame above, whence it is carried away through a line of sluice-boxes to a final dump.

Confined as the material is, within this tight iron pipe, it is necessarily impelled forward with the velocity of the steam itself, and as each particle of gravel or other material is directly acted upon by the full force of the steam discharged through the hydraulic nozzle, it is considerably disintegrated by this action, as well as by the friction along the pipe in its ascent, and the pulverization is so complete that long and expensive outer flumes or lines of sluice-boxes are rendered unnecessary.

It will be understood that the character of the gravel deposits whether good piping ground, or hard, compact conglomerate formations, governs the size of the hydraulic giants to be used, and consequently the quantity of water requisite for piping purposes. It must also be remembered that the greater the pressure of the water at command, the larger the quantity of earth, gravel, sand, etc., that can be raised through the elevators, and, consequently, that the dimensions of the outer flume or line of sluice-boxes must necessarily be proportionately increased for such greater

### Congress of Anthropology.

The first International Congress of Anthropology ever held in this country will convene at Columbia college, New York, June 4th to 7th inclusive. It will be in the direction of an investigation of man himself, a discussion of his place in the scheme of nature, an examination into the underlying laws of his mental growth, and a description of the variety of the species, their characteristics, their locations and their relationships. These are the topics which will be discussed in the sections of Anthropology, Ethnology and Ethnography.

The section of prehistoric archaeology will take up the study and discussion of the relics of human activity which have been preserved and found, beginning with the appearance of man on the globe. A discussion of the topic of prehistoric archaeology reveals the earliest condition of the race, and the germs of those arts and sciences which in later generations continued in ever-increasing development. It shows the complex fabrics of later social conditions in their simple original forms, and thus facilitates their analysis. It brings out in strong contrast the very slow progress of man in early times, and in his lower conditions, compared with more cultivated epochs. It furnishes a valuable key to the events of history

the "Prehistoric Archaeology of the Western Hemisphere" the date of the discovery by Columbus separates the historic from the prehistoric or American annals. Under this title comes the Paleolithic period, paleolithic period in North America, in South America, Neolithic period, archaeology of the area of the United States, archaeology of the area of Mexico and Central America, archaeology of the Andean nations, and archaeology of the areas of Southern and Eastern South America and the West Indies.

To avoid confusion and to insure uniformity by the writers of papers to be read in the section of Archaeology, in the employment of terms by which the later geologic epochs are designated, it is understood that the division of the geologic record as applied to the history of man be as follows, viz.:

The rocky strata which make up the earth's crust divided into Primary, Secondary and Tertiary strata.

The Tertiary age or epoch, subdivided into three minor ages, the Eocene, the oldest; the Miocene, and the Pliocene, the latest.

After this is placed the Quaternary epoch, called by some the Pleistocene, synonymous terms designating the period intervening between the close of the Tertiary epoch and the beginning of the Geologic age in which we live,

this being known as the alluvial or actual age. This Congress will therefore consider, in their use of terms, the Tertiary to embrace the Eocene, Miocene and Pliocene, and to terminate with the latter. The terms Pleistocene, Post-Pliocene and Diluvial will be considered as synonymous with Quaternary. The terms alluvial or recent deposits will be reserved for expressing those which may be considered as still in the process of formation. The Glacial epoch at or near the close of the Tertiary period marks the probable first appearance of man, as it is in the strata of this age that we find the first unequivocal traces of his presence.

For any additional information, inquiries may be addressed to Dr. Edward C. Mann, President New York Academy of Anthropology, 128 Park Place, Brooklyn, N. Y. The foreign membership of the New York Academy of Anthropologists of the world.

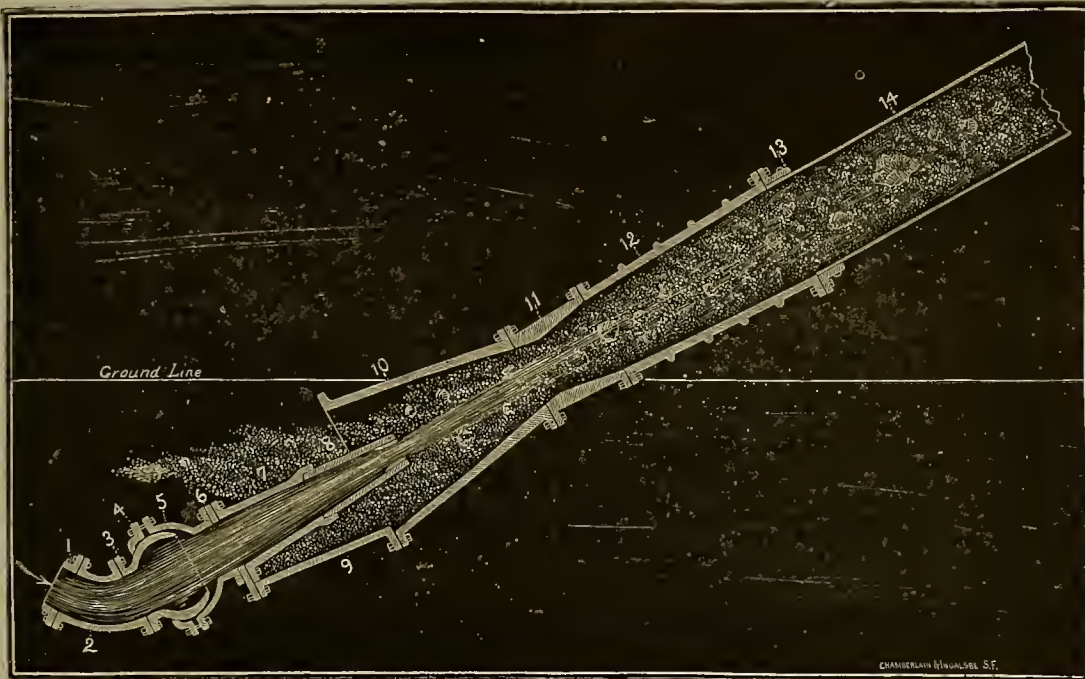
### Mechanics' Institute Fair.

At a meeting of the Trustees of the Mechanics' Institute, held last Tuesday night, many letters were read from county officials in different parts of the State, saying that their counties intend to make exhibits at the forthcoming exposition, and asking about space, freight rates, etc. Trustees Stump, Bassett and Hoppe were appointed a committee to obtain information regarding freights and special rates for the benefit of intending exhibitors.

It is understood that on all branches of the S. P. in the State, perishable articles intended for the fair will be carried free, and non-perishable returned free.

In view of the fact that a larger number of county exhibits may be looked for this year than ever before, General Agent Stout recommends the removal of the Union hotel on Hayes street, and the erection in its place of a middle annex to the pavilion as increased room is needed. The matter is under advisement.

At the station of Fountain, Colorado, some freight cars which had broken loose from a train collided with a passenger train standing at the station. A car full of naphtha was ignited, and in turn 17,000 pounds of dynamite on another car were exploded. Five persons were killed and 25 injured. The damage to the town is \$60,000, and to the railroad company double that amount.



SECTIONAL VIEW OF HYDRAULIC ELEVATOR

pressure, and a larger volume of water be required for the proper washing of the material discharged through the elevator upraise pipe into the outer flume or line of sluice-boxes.

In the sectional cut, the following are the names of the improved parts of the form of "Hendy" hydraulic gravel elevators: Section No. 1, water-pipe flange; No. 2, half-elbow; 3, 4 and 5, hall joint; 6, hydraulic hntt; 8, nozzle; 9, elevator ground section; 10, elevator-entrance section; 11, elevator throat section; 12, elevator outer section; 13, outer pipe flange; 14, elevator upraise pipe. The numbers of elevators are governed by the diameters of these respective upraise or discharge pipes. No. 1 elevator has 12-inch diameter, upraise pipe; No. 2 has 16-inch, and No. 3 has 20 inch pipe.

NEWS has been received from Bisbee that at a meeting of the officials of the Copper Queen Mining Co., the route of a new railroad from Fairbank to Bisbee, a distance of about 40 miles, was decided upon, and the work will soon be commenced. This will connect one of the leading copper mines of the country by rail with the outside world, and is considered a great boon to the Territory of Arizona.

ORE that assays £2200 to the ton has been reported from the Marototo district in New Zealand. There is wild speculation in silver mining stocks in Sydney, Melbourne and Adelaide. There is great activity in Newcastle owing to large shipments of coal to San Francisco.

THE Central Nevada warns miners that there is no demand for them in that part of Lander county.

by revealing the causes of this important change.

Under the head of the "History of Culture," will come a discussion of the moral, intellectual, social and politico-economical, as well as political developments of nations of antiquity, of the Middle Ages and of modern times. In short, this Congress will have for its objects the study and discussion of General Anthropology in a strictly scientific manner, and will discuss man in all his leading aspects, physical, mental and historical.

In the section of Ethnology the topics discussed will aim to explain, as those in the section of Ethnography will aim to describe or depict, the physical condition, stage of culture, and the social life of the various tribes of men with the final aim of interpreting, in a comparison of such facts, the universal laws of progress of the human species. Among the topics are: food supply, sexual relation, language, technology, government and laws, religion and civilization, as the result of ethnic development.

Under Ethnography will be discussed the Oceanic peoples, the Americans, Mongolian, the Dravidian peoples, the Arabic-African race and the Indo-Europeans.

The object of Prehistoric Archaeology is to restore the history of the race during those periods for which we have no written records, and to throw new light on the relations which the species of man bear to other animals, lower in the scale of zoological life, and to illustrate the laws of his evolution, physical and mental.

Under the sub-title of "Prehistoric Archaeology of the Eastern Hemisphere" will be considered the ages of Stone, Bronze and Iron, and prehistoric art in Europe. In considering



## MECHANICAL PROGRESS.

## A Few Rules for Lubricants.

1. To secure the highest possible efficiency of machinery and maximum economy in the operation of establishments in which it is employed, lubricants must be very carefully selected with reference to the precise conditions as to pressure and velocity of rubbing met with in the individual case. Where, as in machine-shops and mills, for example, there exist great differences in these respects, it will be found best to use different oils, as heavy oils on the engine bearings, special cylinder oils in the steam cylinder, lighter oils on the shafting, and the lightest of the better class of lubricating oils on light machinery, as on spindles.

2. Differences in price of oils or other lubricants are usually of exceedingly slight importance in comparison with differences in costs of power, and the value of the coefficient of friction is therefore of vastly greater consequence than either the price of the lubricant or its endurance.

3. The best oils for specified purposes should be taken as a rule, whatever their market price; while the oils which are not well adapted to the purpose in view cannot be economically purchased at any price. It will often be found that the best quality of oil is not necessarily the best oil for any one specified purpose. An oil may be intrinsically excellent, and may be a very expensive oil, but may, nevertheless, be absolutely worthless for the purpose in view.

4. The cost of using a lubricant which is not well adapted to the work is so great that nuggets should always be tested, and their adaptability to the special case determined by a correct system of chemical and physical tests, and by trial upon a good testing machine, if possible, under the exact conditions of the intended use. The determination of the quality of any lubricant is an easy task; but the identification of the real conditions of use, as proposed, may sometimes be difficult. Where journals are kept in good order and are properly proportioned, no difficulty need ever arise in the attempt to find the best possible lubricant for them. As a rule, there is no excuse for a condition of machinery which gives rise to such uncertainties. Testing machines are now made in sufficient variety of form and of ample range of application, and of such satisfactory accuracy that there is no longer necessity of accepting the risks, and of meeting the enormous expense involved in the application of lubricants of unknown quality to valuable machinery.

5. Where lubricants of the precise quality desired are not found in the market, it is advisable to secure the right grade by mixing. This can always be done by making a series of mixtures of good oils, such that, at the one side, the gravity and other qualities shall be too high, and on the other side too low for the special application had in view, and thus working out after determining by trial the law of variation, the mixture must prove suited to the purpose. By this method the quality of the oil has sometimes been improved for a special kind of work more than 100 per cent. Satisfactory results can almost invariably be obtained by careful and skillful work.

## The March of Invention.

"The Growth of Manufacture in the United States" was the subject of a lecture recently delivered before the Franklin Institute in Philadelphia, by Edward Atkinson of Boston. The lecturer dealt not so much with statistics as he did with great social questions, and the increase of the production of cotton goods during the last decade was not dwelt upon to the same extent as the question whether the growth of manufactures did not tend to dwarf the mental powers of a great portion of the people.

In his opening remarks Mr. Atkinson said the question to be solved was whether the increase of wealth is really a gain for the country. "I believe," he said, "that man has been endowed with progressive talents, and that the struggle for life has a loftier end than the maintenance of mere human existence. It would be easy to make statements taken from the census reports showing the great amount of capital invested in the United States, but these figures in the census are not worth the paper they are written on. They are delusions, mere inferences. Even if such data were accurate, what would it be worth a year hence, with the constant introduction of new inventions? It is a rule that every new invention produces the same product on a capital less than was invested before." Mr. Atkinson spoke of machines called slashers used in cotton manufacture, and stated that he visited a mill several years ago and found eight men running the machinery, then valued at \$10,000. Recently he visited the same mill and found an improved machine, valued at \$3000, doing the same work as the \$10,000 apparatus and only requiring one man to run it.

Invention, he said, was the destroyer of capital. He referred to the great farms of the West, and showed that in 1874 the big reapers were followed by seven or eight men to bind the grain, while two years later each reaper had a self-binder attached to it. On the farms, with wages at \$25 a month and board for permanent employees, wheat is made for 40 cents a bushel, while in Rhenish Prussia, with wages at \$4 a month, it costs 80 cents a bushel.

The low-priced wheat of this country feeds the people of England. Except for these inventions we could not sell our wheat so advantageously. The lecturer explained that it was in the intervals between these ebbs and flows of progress that people suffered most from want. When new inventions, universally used, throw thousands out of employment for awhile, in each case capital tended to become less and less in proportion to the product.

The growing difference between the wages of skilled and unskilled labor and the good and ill effects of the introduction of the manufacturing system was touched upon. The germ of the woolen factory was in the fulling-mill, the cotton factory originated in the cotton gin. Before the war the most pernicious effects of the slavery system was upon the poor whites of the South who owned no slaves and were brought up in ignorance. Since the war, however, iron, steel and wood-working—in fact, all the arts of peace have all been introduced in the South.

The development of the railroad lowered the value of land in the East and increased it in the West. Continuing, Mr. Atkinson said: "If we take capital invested as given in the last census for any one branch, and add 20 per cent to bring it up to the present value, we will not find a single branch in which the capital invested equals one year's expenditure for railroads. Here we have a manufacture of the most important kind that is not included under that title. There is no better standard by which the prosperity of a country may be measured than by its consumption of iron and steel. During 1887 the consumption in this country of 9,000,000 tons of iron exceeded the production of all the iron mines of Great Britain."

The woolen manufacture, the lecturer said, was still an infant industry.

## Rolling and Forging Iron.

It is said that the reduction of iron in the process of rolling is facilitated by changing the shape of its cross-section from one simple form to another at each pass; as from square to oval, oval to round, or feathered to square; the object being to leave it, from each groove, in such shape as shall best fit it in passing through the next, to extend greatly in length and little in width. While, therefore, it is apparently being distorted from the form which it is finally to assume, it is really being modeled in the shape which is calculated to produce that form in the most direct manner. Something analogous to this is met with in forging, where things are to be made in such shapes as make it difficult to hock the stock into each part in the proper proportions. In such cases, it is sometimes expedient to block out the piece with the principal object in view of distributing the stock in the different parts, in approximate proportions, purposely leaving, for the finishing operations, the work of getting it into the required shape.

Gun-triggers were formerly made by taking advantage of this method. They were almost universally forged by hand, until 1859-60, but have since been made much easier with the drop. The finger-piece of the trigger is broadened to give a good hold, while the part that goes up through the guard is quite thin. The process of making them formerly was to take a piece of flat iron, turn it edgewise and hammer the end down, on the inside corner of the anvil, and then put it into a stake, set in a cow-block, and hammer it into an impression there, which gauged the amount of stock left in the finger-piece, and thinned down the back. The stock for the finger-piece was all on one side, and, although this did not look much like a trigger, the stock was there in the right proportions.

The thin part was then put into a slot and two or three blows struck on the finger-piece to draw it over into the middle, after which it was put into jumper-dies, and these finished it in a very smooth and perfect manner full as nicely as they are now made.—*American Machinist*.

A MAMMOTH STEAM BOILER.—The Parkinson Manufacturing Co. of Saranton has just completed the largest boiler ever constructed in America. It is to be used in the Calumet and Hecla copper mines of Michigan. The boiler is 35 feet 4 inches in length, 10 feet 6 inches wide and 11 feet 6 inches high. It would require one man 2200 days to build the boiler. It weighs 45 tons and is of 1000-horse power. The boiler is made of steel from the Otis Steel Works at Cleveland. One sheet used weighed two tons. The steel from the "crown sheet" to the "wagon top" is 1½ inches in diameter, that near the valve is three-fourths of an inch, and the other parts nine-sixteenths of an inch in diameter. There are 198 three-inch tubes in the boiler, a double firebox connecting with the flues, and stay-bolts and rivets are used, varying in length from six inches to ten inches. There are 30 "band holes" for the purpose of cleaning the boiler, which may serve to illustrate its immense size.

IMPROVEMENT IN SPEED OF ELECTRICAL TRANSMISSION.—When the first electric telegraph was established the speed of transmission was from four to five words a minute with the five-needle instrument. In 1849 the average rate for newspaper messages was 17 words a minute. The present pace of the electric telegraph between London and Dublin, where the Wheatstone instrument is employed, reaches 462 words; and thus what was regarded as miraculous 60 years ago has multiplied a hundred-fold in half a century.

## SCIENTIFIC PROGRESS.

## The Development of Speech.

## The Gradual Process of Civilized Speech from Instinctive Verbal Sound.

Exceedingly interesting is the process of language development in a babe. No study in anthropology is more fertile. The babe's first cries are purely instinctive, and therefore purely animal. Its consonants are m and b, labials and liquids—used with the open vowels. It does not use the genial tubercle, nor for many weeks the frontal brain. Its second lists of sounds move further back and are g, goo, gutturals of the simplest sort. This g sound, with its natural associate, l, becomes the well-known basis of all primitive languages—the clicking or glicking of Ainos and Hottentots.

Next observe the babe as it watches your mouth and laughs at your cooing and your baby talk. It finally sets its own articulating organs in motion and imitates you. The consequence soon is the simple use of the frontal brain and the genial tubercle. The goo goo is followed by eh eh and obe che, and soon after by modulation. These are not only the first use of truly human organs, but the first cerebral sounds, as distinct from instinctive and inherited utterances. The steps toward a highly complex cerebral language are thereafter rapidly taken.

We have to bear in mind that the babe organically follows historic evolution and is an epitome of past progress. So also in his speech he moves on and over the pathway of the past and reviews it all. An intelligent child expresses approbation by the same sounds that are used by adult monkeys. The savage hardly uses cerebral sounds at all. The refinement of languages has ever consisted in eliminating the animal inheritance. The child's use of gestures is his hands; only to secure muscular strength to direct them. His play is at first purely animal frolic, rejoicing in shouts and shrieks that later he does not find necessary to his enjoyment. His laughing and crying can be understood as language, as they surely are also in adults.—*Popular Science*.

CURIOSITIES OF MAGNETISM.—Most well-informed people are doubtless aware that the globe on which they live is a great hall of magnetism, but comparatively few have an adequate idea of the influence this property is continually exerting on all sides, that many common but inexplicable phenomena can be traced directly to this source. Statistics go to show that in the matter of steel rails, as many as 13 will become crystallized and break where they go to make up a railroad track running east and west, before one of those on a north and south track is similarly affected. This is entirely due to the magnetism generated by friction, and the fact that the polarity of the magnetic current is, in the former instance, resisted in the headlong rush of the train, whereas in the latter case it is undisturbed. Another strange effect of this peculiar and occult force is that exerted on the watches of trainmen. A timepiece carried by the conductor running a train 20 miles an hour, however accurate it may be, will, if the speed of the train is increased to, say 50 miles, become useless until regulated. The magnetism generated by the flight of a train may be said to be in proportion to the speed with which it is propelled, and the delicate parts of a watch, numbering all the way from 400 to 1000 pieces, and peculiarly susceptible to this influence by reason of the hammering and polishing they have received, are not slow to feel the effect.

MORE AND MORE WITH THE FACTS OF SCIENCE.—The facts of science are coming nearer and nearer to the general interests of mankind. Science is already installed as an important factor in almost every line of industry. It is an indispensable requisite in almost every workshop. It is the handmaid of the engineer, the mechanic, the tradesman and the agriculturist everywhere. Nearly all the journals of the day devote more or less space to its consideration in such relations. Our leading magazines are keeping abreast of the affairs which interest all thinking, progressive people. Our industrial engineers are recognizing and dealing with the facts which are constantly coming to light in these days of practical research into the hidden mysteries of nature. Science is constantly opening up new industries and new modes of conducting old ones. It is the essential medium through which nearly all progress in the modern march of improvement is made possible.

ENGRAVING BY GUNPOWDER.—Shooting a candle through a two-inch plank without disturbing it in the least is being outdone by dynamite, which is so quick in its action that a green leaf can be compressed into the hardest steel before it has time to flatten. One of the experiments at the United States torpedo-works was to place some leaves between two heavy flat pieces of iron, set them on a firm foundation, and see what gun cotton would do in forcing the iron pieces together. A charge was placed upon them by compressing the gun cotton into a cylindrical form about one inch thick and three or four inches in diameter, through the center of which a hole is made for a cap of fulminate of mercury, by which the gun cotton is exploded. The reaction was so great, from just being exploded in the open air, that one of the iron pieces was driven down

upon the other quick enough to catch an impression of the leaves before they could escape. It is a singular fact that the block of gun cotton itself should sink deep into the iron when it explodes, showing the prints of the letters that have been stamped into the cartridge, and still more so when we find that the letters sunk into the block of explosive material are not left raised on the iron, as they would be if pressed slowly into a piece of wax, but just the reverse, a depression in the cylinder of gun cotton forming a corresponding depression in the iron. This would seem to indicate that the particles of gas, as they generate, require time to get underway to penetrate far into a solid, and gives them a chance to store up a little energy by having a short space to act through.

AN AIR PUMP COMPRESSES AIR HIGHER THAN THE STEAM DRIVING IT.—Lately, says an exchange, some have been discussing the question whether a Westinghouse Standard air pump, which has the pistons in the steam and air cylinders of exactly the same size, can pump a greater pressure of air than the steam that is driving the pump. At first sight this appears to be a paradox, but it is certain that it is often accomplished, and the operation can be easily explained. At the beginning of the stroke, the piston receives a full pressure of steam, but there is little pressure behind the air piston to offer resistance. The consequence is that a certain velocity is imparted to the piston, and before the end of the stroke is reached there is the momentum of the pistons besides the full steam pressure available for doing the work of compressing the air. For instance, the pistons and the rod weigh say 15 pounds, and before the end of the stroke is reached they move at the rate of ten feet per second. This mass of moving metal possesses energy for doing work in proportion to the speed plus the weight, and is sometimes, in practice, converted into the work of compressing the air above the pressure of the steam that is driving the piston.

CUTTING DIAMONDS.—Some idea of the slowness of the work of cutting diamonds and the power required may be inferred from the following account of the cutting of one of these gems: This diamond was made up of a multiplicity of "twinings," and was of the character called *extreme durate* by the French. It had been cut into the rude form of a brilliant, and its table had been placed on a diamond polishing wheel for 100 days. The average circumference of that part of the wheel on which it was placed being about 2½ feet and the wheel going at the rate of 2800 revolutions per minute, the surface that traveled over the diamond table amounted to over 75,000 miles. At times 4 and 8 pounds were added to the usual 2½ to 3½ pounds of the clamp or holder, and for a time 40 p under extra were added, this last causing the wheel to throw out scintillations for several feet. The diamond fairly plowed the wheel, practically ruining it, so that it required planing before it could be further used. No polish was produced, however, sufficient to give the brilliancy necessary in any diamond gem.

THE GEOLOGICAL MAP OF EUROPE, which has been for some time in progress of construction under the auspices of the International Geological Congress, is nearly complete and will soon be issued to subscribers. As almost all, if not all, the leading institutions of learning and of research in the country are subscribers to this map, it is time for those who desire to avail themselves of the opportunities of securing it, at 20 per cent less than its market price, and before it is sold to the general public, to send their names in to Dr. Persifer Frazer, Secretary American Committee, 201 South Fifth street, Philadelphia. The cost of the map to institutions will be \$21, and to individuals \$26, the difference being the duty, which to the former class is not chargeable. No money contribution is required until the map is issued, which will probably be not before next fall or winter.

FIRE DAMP AS FUEL.—Natural or coal mine gas is at present being utilized for fuel purposes in England. All the gas heretofore known as fire damp is brought under the steam boilers at several coal mines. The machinery used and the process by which the gas can be used are the inventions of Arthur Shipley, a civil engineer. The Tyne colliery in England saves \$15,000 a year in labor alone by the use of this fuel. This fuel can be used in all parts of the mine to generate steam, and will reduce the cost of labor in coal mines to a wonderful extent. Shipley is in Pittsburgh conferring with Westinghouse relative to his patent.

A NON-SPEAKING TELEPHONE is exhibited in Pittsburgh. A sensitive plate presses against the larynx and glands of the neck, and as the jaws are moved in conversation the motion sends the words along the wire as distinctly as the telephone now in use.

CARBONITE, the flameless explosive that has been found safe even in an atmosphere of fire-damp, is manufactured by Schmidt & Bichel, at Schlehenhof, Westphalia, Germany, but arrangements are being made in England also for its manufacture.

ELECTRICAL EMPLOYMENT.—A low estimate puts the number of persons supported by all the forms of employment furnished by electricity at 5,000,000.



## GOOD HEALTH.

## For Fat People.

Intemperance in diet, indulgence in the excessive use of alcoholic drinks, too little bodily exercise in the open air—these are the more important of the causes which bring on corpulence, says a recent writer. As muscular exercise increases the production of flesh, inaction leads to an excessive deposit of fat. Alcohol acts in a manner precisely similar to that of fats, sugars and starches. It interferes with the destruction or combustion of the fat-producing materials, prevents them from undergoing combustion, as it is more easily destroyed by oxygen than they are. Certain diseases, such as any interference with the formation and development of the red blood corpuscles, the oxygen carriers, increase the disposition to the deposit of fat. The oxygen may enter the lungs, but without these carriers it is unable to reach the tissues where combustion ordinarily takes place.

The dangers of corpulence are many fold. All diseases accompanied by high fever are apt to follow an unusually malignant course in fat persons. The heat developed in these affections cannot be so readily lost by radiation or conduction as in the lean. The cold bath, the cold pack, and all forms of cooling measures fail to really reduce the temperature, and the fever is, in itself, a serious source of danger. The skin is constantly bathed in perspiration on slight exertion or when the external temperature rises. Hence, skin diseases are common and often intensely annoying among the corpulent. The breathing is interfered with by the accumulated fat, so breathlessness on exertion is common among them. The frequency of perspiration leaves the surface exposed to chilling influences which cause coughs, colic, bronchitis and pneumonia. The overloading of the heart with fat interferes with its action, so that palpitations and sudden faintness from partial failure of this organ to do its duty are not infrequent. The extra weight that has to be carried entails muscular exhaustion on exertion, such as is not felt by the thin person. The discomforts and dangers of obesity would fill a much larger catalogue, but it is not necessary to enumerate them all here.

The treatment of corpulence must vary with the cause. No rigid rules can be framed that will serve in all cases. If there is a strong hereditary tendency to it, a radical cure cannot be expected—only an improvement can be promised, and even this cannot always be secured. The prevention of it should be undertaken when a young person shows a strong tendency to put on an excessive amount of adipose tissue. One of the first things to be done in this direction is to regulate the diet. Immoderate indulgence at the table must be rigidly forbidden, yet the food must be in sufficient amount to secure all that the body requires for its needs. No starvation should be countenanced. Fatal weakness of the heart or permanent disorder of the digestion often results from irrational restrictions of diet. The temporary thinning is usually followed by a marked increase in the corpulence beyond what existed before the "Tanner plan" was adopted. A much better plan is to avoid exciting the appetite by too great variety of food. Prince Bismarck's physician succeeded in curing his patient by the very simple plan of making the meal consist of only one kind of food, of which he should eat as much as he pleased, and no drink of any kind to be taken at meals or until two hours afterward. By this means no unnatural appetite was encouraged, and the patient ate only what the necessities of the system really demanded. The diet should contain an abundance of albumen, little fat, and still less starch or sugar, when an earnest effort is being made to reduce corpulence or provide against its making its appearance. Some fats have to be taken, or the albuminous foods will not be digested or appropriated by the system. If signs of disordered digestion appear, the diet must be modified from time to time by the addition of articles which are usually forbidden. It is better to incur some of the prospective discomforts or even dangers of obesity than to ruin the digestion in the attempt to avoid them.

## A Substitute for Cocaine.

The *Pacific Record of Medicine and Surgery* describe on authority of a German publication a new local anæsthetic of surprising power and rapidity, viz., hayah or erythrolein. Its intensity, says the doctor, is *uberrischend*, and it is destined not merely to supplant, but to quite overthrow and destroy, the reputation of cocaine. It is of African origin, and is found in the shape of a red mass called hayah. A minute portion placed upon the tongue renders the organ utterly devoid of the sense of taste or even of sensation. Chemically, it is a glucoside. A drop or two of an aqueous solution placed in the eye of a cat renders the organ absolutely insensible in 15 or 20 minutes, and it is more or less anesthetized from 10 to 24 hours afterward. Inwardly or subcutaneously injected, it renders frogs and such animals inert, the frequency of heart-beat is lessened from 33 down to 8 beats per minute, and a spasm or cramp, beginning at the eyes, passes over the entire body every few moments, extending to the very end of the tail. In animals that vomit this reflex occurs within a few moments after injection. The source of this wonderful medicament is said to be a plant

described by Oertel in the early part of this century under the name of erythrolein judiciale, the substance being used in the native African trials by ordeal. In these trials the bark of the plant is powdered and mixed with water and given to the accused to drink. If vomiting follows immediately the accused is held to be guiltless, but if he fails to vomit the contrary was held, and he was immediately clubbed or stoned to death. The Berlin Museum possesses the material originally sent to it by Oertel, and recent experiments with it develop the fact that the material now sent from Africa under the name "hayah" is an extract of the same, and the active principle obtained from both is identical. The *Record* adds: "We await further developments with great interest."

**A SIMPLE HEALTH SUGGESTION.**—Sleeping-rooms should have a plentiful supply of pure air, which is best obtained by opening windows. "But night air is not wholesome this damp weather," said a gentleman, lately. "My dear sir, what other kind of air is there in the night but night air?" was the reply. After a winter's depression of vital tone, and especially after exposure to Arctic blizzards, a plentiful supply of oxygen is doubly necessary, and there should be no hindrance to free circulation of air while voluntary life is still. If every one would take half a dozen deep inhalations twice or three times daily, beginning with the arms hanging down and an empty chest, and gradually raising the arms until when the lungs are full they are stretched directly upward, there would soon develop a sturdy power of resistance to cold that would add much to our comfort.

**REMEDY FOR POISON OAK—DON'T EAT THE LEAVES.**—A correspondent of the *Morning Call*, who has suffered terribly from poison oak, was cured in a few days by using as a wash a decoction of wormwood leaves, made quite strong. The weed grows abundantly where poison oak abounds, so we find the poison and its remedy growing side by side. The correspondent further adds: "I hope no one will try that foolish idea of eating the leaves, for I should have tried it myself had I not seen a child, whose parent made it eat some, suffering in great agony, and narrowly escaping death."

**REMOVING MOLES.**—The fair sex owes still another debt to the scientist. A lady who had a mole on her shoulder and who, from this reason, was unable to display her otherwise fair and attractive corporeal possessions, has had an electrical operation performed with perfect success. The mole was perforated with electric needles in every direction. After a week the mole, which had been burnt to a black mass, fell off and left the skin in good condition. The new skin showed hardly a trace of discoloration, and she now wears the most fashionable hall-dresses with impunity and success.

## USEFUL INFORMATION.

**CUTTINGS FOR FLOWERS.**—With the encephale and flowers of May, and the general awakening of vegetable life, comes the season for rooting cuttings of flowers which girls love to grow and enjoy. They need, for cuttings of all soft herbaceous sorts of greenhouse flowers, only a saucer of water full of clean sand and the sunny window of a warm room in which to set it. The sand serves to hold the little cuttings in place and erect, with the leaves above water. The best cuttings are the young, tender ends of the new growth just starting on the old plants kept over winter. Cuttings an inch long or less, with two to four leaves, set at once in the warmed sand and water, seem to forget their severance and go on expanding upward and sending out roots downward with charming goodwill. Try with some fresh tips of verbenas, colsenes, double petunias, scarlet sage or any other such soft-wooded plants. Put them into water at once and keep warm so that they may not wilt in the least, and the result will be delightful in itself and a most pleasingly useful occupation of time and thought. When roots have formed half an inch long or more, the little plants should be put each into a separate little pot of soil. Paper pots of tough material answer well.

**CASTOR OIL AS A LUBRICANT.**—A correspondent of the *English Mechanic* writes as follows in a recent issue: "The Asiatic wire-drawers have very long ago used this oil in preference to any other kind. Their dexterity is surprising, the wire for the Trichinopoly chains of gold and silver being like hair, and every good workman draws his own. A man made me a plate for the fine gauges from a flat rasp of English steel, which I still possess. He drew copper, zinc and brass equally well. This oil, being one of the cheapest in India, is used to soften harsh leather shoes and ropes. The fresh leaves of the castor-oil tree, too, are gathered, bruised and rubbed in the hand, then stuffed tightly into stiff European boots, male or female, and so remain all night; the leather then becomes quite supple. For feeding large drills I like this oil mixed with soft soap."

**A NEW HECTOGRAPH** of German invention is made from a sheet of blotting-paper which has been soaked in a solution consisting of four parts of gum, five of pure water, three of am-

monia, three of sugar and eight of glycerine. The gum is first dissolved in a mixture of the water and ammonia, which is then heated to boiling and the sugar and glycerine added. The hot solution is then spread over the paper with a brush and left to dry during a period of three days. When used, the paper should be dampened with a sponge and left one or two minutes. The drawing or writing to be copied is placed over the copying-paper, face downward, and pressed with a roller or the hands. After one minute it is taken away and a sheet of paper substituted, on which the drawing is copied by simple pressure with the hands, as previously described. Several copies can be obtained from an original, and the same copying paper can be used for reproducing other drawings after a period of 24 hours.

**MATHEMATICS AND ARITHMETIC.**—Like most ordinary mortals, mathematicians are inclined to shirk dealing with figures. Even Newton, the great master of the most abstruse calculations, could not, we are told, cast up a sum in addition; and the works of M. Stas, said to have had never an equal in exactitude, have been found to contain an astonishing number of arithmetical slips. Prof. Huxley has given the weight of air on a square mile as about 590,129,971,200 pounds, containing not less than 3,081,870,100 pounds of carbonic acid, in which is 371,475 tons of carbon. The real quantities, as figured by Sydney Lupton, are 59,133,431,808 pounds of air, 31,464,399 pounds of carbonic acid, and 375,227 tons of carbon. Another writer has proven the water under a westerly equatorial current to be 12 per cent higher than under an easterly equatorial current, this false result being based on an arithmetical error.

**THE DECIMAL MONEY QUESTION IN ENGLAND.** The decimal system of money is a question that at present is receiving considerable attention in England. In this, as in some other things, England is just a century behind the United States. For a few years past there has also been an awakening on this subject of Protection (or Fair Trade, as it is called over there) and in the course of 90 or 100 years we may expect the English Government to adopt the "American system." Then our manufacturers of steel rails, locomotives, cloths, etc., will have to pay duties on their shipments to that country, and the English people will wonder how their ancestors could have been so stupid as to follow the ignis fatuus of Free Trade for so long a time. They will, of course, attribute it to their progenitors' slow ways, and will not be too indulgent to their memory.

**CHOCOLATE** is made from beans that grow in pods on the cacao tree. The trees are numerous in the West Indies, and it is from there we get our supply. The beans are brought hither in the pod and put through a regular manufacturing process to produce the chocolate-oakes that we use. The first operation is the breaking of the husks and separating them from the kernels by a blast of air. Then the beans are ground with sugar by revolving granite grist-stones. The stones are heated, and the oil contained in the bean makes the mass adhere and become a thick paste. This pulp is now partly dried and the air-bubbles are squeezed out in a press, after which it is transferred to the cooling-tables and thence to the molds.

**TO CLEAN AND POLISH BRASSWORK, BRASS PIPES, ETC.**—Take one ounce oil vitriol, one-half gill sweet oil, one gill powdered rottenstone, 1½ pints rain-water; mix and shake well before using; add to the mixture one-half ounce nitro-myrrhane to make it smell good, stick on a French or German label that nobody can read, hoom it in the paper as a newly discovered polish just imported, and you can do a good business. At any rate, you'll have a No. 1 polish, and if your customers don't read the papers too closely, you may get rich selling it. Put on with cotton waste and polish with woolen or chamolis.

**TO DRAW OR WRITE ON GLASS.**—The *Scientific American* advises the use of a varnish of sugar. This is made as follows: Dissolve equal parts of white and brown sugar in water to a thin syrup, add alcohol, and apply to hot glass plates. The film dries very readily, and furnishes a surface on which it is perfectly easy to write with pen or pencil. The heat ink to use is India ink, with sugar added. The drawing can be made permanent by varnishing with a lac or mastic varnish.

**FINDING THE SUN IN A STORM.**—A correspondent writes to the *Boston Journal*: Reading accounts of so many things lost in the snow and fog, I would call your attention to a simple means of determining the position of the sun at any time of the day, which is by placing the point of a knife-blade or a sharp lead-pencil on the thumb-nail, which will cast a shadow directly from the sun, no matter how thick the snow or fog is. Try it.

**THE OSTRICH FEATHER** trade of South Africa is so depressed that the feathers which formerly sold for \$125 now bring only \$7.50, and the value of the birds has declined accordingly.

**TO CLEAN SOLDER** from old files, soak the file in raw muriatic acid for 24 hours and you will have almost a new file.

## ENGINEERING NOTES.

## The Sustaining Power of Piles.

The calculations of the sustaining power of piles is one of the most uncertain and unsatisfactory processes which architects and engineers are called upon to wrestle with. There are plenty of formulae, some practical and some theoretical; but all, as a rule, have been constructed to serve different special cases, and give widely divergent results such when applied to the same conditions. The Sandere formula is the one most generally accepted, and with hammers of a ton weight, and a sinking at the last blow of two, three, four, or five inches, its results under certain conditions are tolerably accurate as to the maximum safe resistance of the pile; but under other conditions it is nearly valueless.

An experiment was made, according to the *American Architect*, with the following results: A pile was driven with a hammer weighing 910 pounds, falling five feet, and sank three-eighths inch at the last blow. By Sanders' formula it should have been capable of supporting safely a load of 18,200 pounds; by Rankine's, of 128,000; by Haswell's, of 72,000; by Nystrom's, of 9000; and by Weisbach's, 111,000. On loading it was found to bear 59,618 pounds without moving, but sank very slowly on the addition of less than 3000 pounds. What should be the factor of safety in such cases it is impossible to say, and Sanders', which would be about three, might not be excessive.

Of course this is only suggested as an attempt to "contract a little the limits of the unknown and uncertain," but it is at least interesting. One observation which Mr. Baker makes is of much importance. The record of driving piles in various places shows that a great difference in the effect of the impact of the hammer results from the "brooming" of the head of the pile. In one case, after the head of a pile which had become badly broomed was adzed off, the efficiency of the succeeding blows was nearly four times as great as before the adzing, and this should form a very important factor in determining constants for practice.

**A NEW INVENTION.**—An improved headlight for locomotives has an adjustment which allows the engineer to conveniently direct the light as he may desire to various points off the line. The lantern is supported on a frame or platform, which has a movement to right or left about a vertical axis, and up and down about a vertical axis, the operating mechanism leading back to the cab so as to be within ready reach of the engineer. By this arrangement the engineer is enabled to examine dangerous or doubtful parts of the road, and in stormy weather to turn the light upon threatening trees or masses of earth or rock, upon either side, and which are liable to fall, so that if they appear in a critical condition, he may instantly check his speed or stop. The device also permits of the lantern being turned so as to throw the light across sharp corners and exhibit the line of track at some distance ahead of the train, and at points which would be entirely out of reach of the light in its usual fixed position. It is well known that in the usual construction and use of locomotive headlights, they are fixed to the engine front, so that the light is always thrown forward and concentrated in one line, this being inadequate in the case of sharp curves.

**A NEW SAFETY CAR-LAMP AND HEATER.**—At Minneapolis, on Dec. 3, a test of the gasoline safety car-heater was made. The heating is done by vaporized gasoline, which sends either hot air or hot water circulating through the pipes in the car. The same gas conveyed to the lamps lights the car. An iron ball, poised and adjusted, is displaced at any unusual jar or bump. In the twinkling of an eye, with one snap, the fire is extinguished. The lamps are put out, and the air-brakes on the whole train are set. As a test, a dummy-car was built of inflammable and flimsy materials on a flat-car, and fitted up with a heater. About a mile beyond the shops, on a desolate embankment, the track was torn up and everything fixed for a bad wreck. The engine took the dummy half a mile up the track and soon it was seen sailing around the curve at a 30-mile-an-hour speed. It reached the broken rail, and then, with a grand plunge through the air, it shot down the embankment. It was completely wrecked, but there was no sign of smoke anywhere.

**A TIDAL WATER-WHEEL.**—The water-wheel that runs the works of the Sagadahoc Fertilizer Company, at Bowdoinham, Me., is probably the only one of its kind in existence. It is 27 feet in diameter, with a foot of its rim out of water at high tide. The spokes are wide and set diagonally, like the vanes of a windmill. It turns 18 hours of the day by tide-power, running one way with the flow, the other with the ebb. With one foot fall of the tide, this wheel gives about 50-horse power. It has been in use since 1861.

**AN ELASTIC SHIP.**—We have already alluded to the proposition to substitute cocoanut fiber for steel in armoring war ships, which is said to be so elastic as to present greater resistance to the penetration of a cannon ball than iron or steel. According to the *Birmingham Age*, the French have decided to coat a vessel with this preparation as an experiment. The vessel so prepared is called an elastic ship.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**KENNEDY.**—Amador Ledger, May 12: The Kennedy mine is moving along as prosperously as could be expected. A portion of the mill is kept running steadily on ore taken from the 750 level. The ore here is of good quality, and there is a considerable body of it. Sinking is being prosecuted as rapidly as possible in both shafts. The new hoisting works over the north shaft are working splendidly—indeed, they are said to be the best works of the kind in the county. About 60 hands are employed about mine and mill. Whittaker Wright came up last week on business connected with the Cleveland mine. The mine is still idle. The new owners of the Gillick mine, near Volcano, are developing that property in a business-like way. They are working three shifts, running drifts and sinking. The indications are very favorable, but they intend to do some thorough prospecting before proceeding to the erection of a mill.

**SUTTER CREEK.**—Our mining interests are moving along in the regular old groove. Sinking at the North Star is progressing slowly. The ground has been quite hard for some time, and does not tear very good in blasting. They are down now to a depth of about 420 feet. There are little stringers of quartz visible, but not of much consequence as yet. It is most likely that they will sink at least 600 feet before they will do any crosscutting.

## Calaveras.

**CAVE.**—Mountain Echo, May 9: One day last week a slight cave took place in the Nevills mine in this town, which brought down tons of good milling ore. The cave did no perceptible damage to the mine. We are informed that the mine is looking excellent and that there is an immense body of good ore in sight.

**MURPHYS.**—Murphys is again assuming its former routine of business. Several of the mines in that section have resumed operations, and other mines will start up shortly.

## El Dorado.

**THE LINDEN.**—Placerville Observer, May 8: Supt. Brown of the Linden placer mine, on Cedar Ravine, is now actively engaged in the erection of a ten-stamp mill for the purpose of crushing the blue cement gravel now being taken out of the mine. The Linden tunnel is now in about 1400 feet and taps the famous old blue gravel channel which traverses the counties of Nevada, Placer and El Dorado, on ranges 11 and 12 East, Mount Diablo Meridian. There are several mills now running on this old lead that are producing large amounts of bullion. The Linden is looking fully as promising as its neighbors. Supt. Brown is hopeful and active.

## Inyo.

**WHITE HILL.**—Inyo Independent, May 12: About two weeks ago Pat Keyes went up on the White Hill, prospecting. Within a day or two he struck a vein of ore. He has already developed quite a nice ore body that shows all the indications of turning out well. Pat Downs is getting ready to pack supplies up to the hill and to pack out ore already taken out. The White Hill country is a good region for prospectors.

**BELMONT.**—The Belmont mine, two miles southeast from Cerro Gordo, turned out a good deal of rich ore in the palmy days of that camp. During several years that mine has been neglected, but recently Jack Davis got a lease of the property and has already taken out several tons of ore of good quality. Much of the ore taken out in the old times went from \$500 to \$1000 per ton. The mine is patented and belongs to Mr. W. L. Hunter. Kelly & McGraw are also working with good results in the same locality.

**IMPORTANT MINING SALE.**—Index, May 9: A rumor has reached the inner sanctum of the Index to the effect that the Union mining property at Cerro Gordo, formerly owned by Belshaw & Beaudry, has been sold to a San Francisco syndicate of mining men. There are millions in it, and if the report proves true we may reasonably expect Old Cerro Gordo to again become the first bullion-producer of the Pacific Slope.

## Nevada.

**PROSPECTING.**—Herald, May 8: Men will take chances in many ways when the venture is not half as promising as in hunting for quartz ledges. There are numerous untouched veins in the country that might make mines. The finder of a promising ledge can generally sell it for more than he could earn at years of hard labor. A walk around in a mineral belt with open eyes is liable to bring the prospector upon such a ledge. The walk is better than lying idle even if nothing is discovered. There are a number of men now acting on this principle in this district and they have made discoveries that may yet amount to a good thing.

**AT THE BRUNSWICK.**—Footbill Tidings, May 10: Within the last few days a ledge has been encountered in the lowest west drift at the Brunswick and the indications are encouraging. The drift is in 230 feet, more than half of the distance being in barren ground. The new ledge is doubtless the one superficially worked years ago by a whim-shaft 130 feet ahead of the present face of the drift, and which paid well and steadily. At this side of the mine there is much virgin ground. Including contractors, there are to men employed at the Brunswick, and the drift spoken of is being prosecuted on very low terms. A large quantity of low-grade ore is awaiting the mill. It is hoped to resume sinking at an early date—the present depth of the shaft being 320 feet.

**HEAVIER PLANT.**—Nothing has been done at the Pet gravel mine this week. With the first of next month a heavier and adequate hoisting plant will be put on the property.

**THE NEVER SWEAT MINE.**—Nevada Herald, May 12: The owners of the Never Sweat mine, located toward Willow valley, are still at work on their ledge and feel confident of uncovering a valuable mine. The rock from this ledge is very high grade, sometimes yielding \$200 and \$300 to the ton. Three years ago the company sunk an incline at a pitch of 45 degrees to the west a distance of 150 feet. From that point they drifted south about 200 feet on a

good shoot of ore. Since then they have run a deep drain tunnel 1300 feet in length and cut the ledge at a depth of 70 feet. This spring they commenced to sink the incline deeper and have found that the ledge turns from a western pitch to an almost vertical position. The change in the pitch has changed the course of the pay shoot from south to north. They have sunk the incline 40 feet on the present dip and find the ledge small, but the rock is of good quality. They have free water and use a hurdy-gurdy wheel for hoisting and pumping power.

**A PROSPEROUS DISTRICT.**—Nevada Transcript, May 9: County Assessor Bond, who has just returned from an official trip to the upper part of the county, says that Graniteville mining district is wonderfully prosperous. Several claims there are producing well, and a number of others are in a fair way to soon become paying properties. The assessment roll of that locality will show a marked increase this year.

**THE EL DORADO MINE.**—The tunnel at the El Dorado mine, south of Columbia hill and between the Grant and Delhi mines, is now in about 350 feet and is going ahead at the rate of 10 feet a week. Quite a stream of water was struck recently flowing from a series of stringers cut in the face of the tunnel.

**THE ELEVATOR PROCESS.**—Nevada Transcript, May 12: As was heretofore briefly mentioned by the Transcript, the Omega hydraulic mine is being operated with the aid of an elevator similar to that which has for some time been in use at the North Bloomfield mine. The washing is done by a monitor, the same as is common in hydraulic mines generally, but the debris instead of flowing off into the South Yuba river is elevated out of the pit where the washing is progressing and carried to depressions in worked-out parts of the claim where it is impounded. It is proving a success, as the Omega Company have to raise the slickens only to about a quarter of the height that the Bloomfield Company does. Some of the anti-mining spies have recently visited the mine, and say there can be no fault found with it by the valley cranks.

## Plumas.

**A NEW PROCESS.**—Greenville Bulletin, May 9: At the Centennial mine, in Genesee Valley, a new method of saving gold is being experimented with by the superintendent, a gentleman from another mining section of the State. A friend has furnished the Bulletin with a description of the process. As the pulp comes out of the ordinary battery, it goes into a trough the length of the battery. This trough is six inches deep by six inches wide. From this trough the pulp runs into a narrow flume which leads it into another trough with tap holes through which the pulp spouts from the latter trough into four sluices covered with canvas duck. The grade of these sluices is  $1\frac{1}{4}$  inches to the foot. The canvas is taken up every two hours and washed in a large tank. The concentrations in the tank are put into a revolving barrel (old Freiberg process barrel) and left there for some time until amalgamation is completed. There is no quicksilver used in the batteries or on the canvas.

**RICH BAR.**—National, May 12: Messrs. Thos. Bracken and G. W. Banghorst claim they have found the feeder that caused the immense deposit of gold on Rich Bar, and are very sanguine that they have a fortune almost in sight. The ledge is at the head of the bar and near the mouth of the French ravine. They have timbers out for 200 feet of tunnel and will commence operations immediately. It is to be hoped that their expectations may be realized.

## San Diego.

**OGELEY DISTRICT.**—San Diego Union, May 10: Walter Garvey and Edward Laundry returned yesterday from Ogeley mining district in this county. The place is situated about 15 miles from Yuma on the railroad. They brought some very rich specimens of gold ore, taken from the mines in the Cargo Muchacho mountains, about four miles from Ogeley. The mines are considerably advanced in development, but at present the mills are closed down for want of water. One company, the Paymaster, which since the first of the year has paid off an indebtedness of about \$50,000, is fluming water 17 miles and keeps its mill going constantly, the output being quite large. The specimens Messrs. Laundry and Garvey brought in are from other mines, and they state that they have a location there, the ore from which mills on an average of about \$54 to the ton. The country is a great one for mining, they say, the mountains referred to being just full of gold. J. H. Dickey of this city exhibited a quantity of gold dust yesterday, brought from a point about 15 miles from Tia Juana, and within 300 yards of the Mexican line. Mr. Dickey stated that he has discovered an extensive placer bed there, and that several pans washed out \$1.25 to the pan. He, together with other gentlemen, will work the claim, commencing operations immediately. The owners of the Burroughs mine, about which so much has been said and written, are making preparations for extensive work in the mine. It is located about 17 miles from this city across the line, and is supposed by many to be the lost mine of the mysterious old Frenchman who died in San Francisco years ago. The shaft is being timbered, and hoisting works are to be built.

## Shasta.

**MAMMOTH.**—Redding Free Press, May 5: The Mammoth mine at Old Diggings is shipping ore to San Francisco. Our reduction works are running to their full capacity, working day and night. Ore is coming in from the Lower Spring mines, and it is panning out satisfactorily to the owners. I. M. Wiley of Delta informs us that Wm. Murry, Ellis, Finley and others have struck it rich on the other side of Dog creek. It seems that they run a tunnel 250 feet, and tapped a mass of decomposed quartz and porphyry. Two sacksful of the mixture, washed out, netted \$1500, and there is plenty of it left. The locality has formerly been very rich in placer diggings. The Mammoth mine is improving every day and they are shipping ore extensively to the Selby smelting works in San Francisco.

**IRON MOUNTAIN.**—Mr. Joseph Bell, brother of our Superior Judge, arrived on Wednesday from a four months' tour among the mines of Shasta and Trinity counties. From him we learn that the Confidence mine on Iron Mountain is now being worked with excellent results. They now dispense with the roasting process, and crush it direct from the mine. His opinion is that the mining interests of Shasta county are but imperfectly understood by outside

parties, or there would be more attention attracted to them.

**GOLD.**—Courier, May 12: Theodore Popejoy of Copper City came in a few days ago and had some splendid specimens of ore, discovered on Kellinger Hill. One of the specimens would weigh a pound, was about six inches in length and half that in width. It was crusted in many places with free gold adhering to a red-colored rock. Popejoy is as confident as ever that the old camp will yet make a big showing among the bullion-producing camps of the State.

**GOOD RETURNS.**—Redding Free Press, May 12: Some two weeks ago Supt. Bergman of the Clipper mine, Squaw creek, shipped two tons of ore to the Selby smelting works at Vallejo, the returns from which, after paying all expenses, were \$209.38. This result was most flattering, and preparations are now being made to ship several carloads of ore. There are some 500 tons of ore on the dump of fair average. Three men are at present employed in running a lower tunnel. Mr. Bergman says that Riley's ten-stamp mill is doing excellent work, and that Jack Conant is working his mine satisfactorily.

**REDUCTION WORKS.**—The proprietors of the Reduction Works are putting in a new Campbell mill, which will double their business capacity; they expect to be ready for a fresh start about the middle of next week. Ore is pouring in upon them from a half-dozen different mines, principally the White Oak of Lower Springs.

**MINERSVILLE.**—Courier, May 5: Nelson Waite has some good quartz at Minersville and also placer mines found in a lost channel of gulch or stream that yields good returns. To say nothing of small gold, he has found specimens which he will bring down in a short time, one of which weighs eight ounces. There is a fine bank of gravel, and an \$80 cleanup of coarse gold, besides nuggets, is not discouraging after a few days' run.

## Trinity.

**THE ENTERPRISE.**—Journal, May 5: The owners of the Enterprise mine at East Fork recently made a good cleanup which was entirely satisfactory. They now have seven men at work and intend to take out a large amount of quartz during the summer and deposit it on the dump, and if every thing shows favorably they will probably erect a mill before another winter.

**BONANZA.**—Trinity Journal, May 10: We learn that operations will be resumed in the Bonanza mine at Minersville next week; the parties who bonded the mine, the time having expired a few weeks ago, have been given another chance.

**MINE LEASED.**—Jas. E. Given of East Fork was in town this week, and predicts a prosperous summer for that camp. He and Frank Moor have leased the Fritz mine from Chris Meckel, and are now crushing ore in the Hippler arastra. They have about 25 tons of ore on the dump, the best of which they will crush.

**HAY FORK ITEMS.**—From Supervisor J. W. Carter, who was in this week to attend the regular session of the Board, we learn that the quartz industry in that vicinity is about as usual. Mr. C. C. Shattuck is running his mill on ore from the Magdalena, and it is thought that it pays satisfactorily.

## Yuba.

**SMARTSVILLE'S MINING PROSPECTS.**—Wheatland Graphic: The Blue Point mine at Smartsville is developing unexpected richness, and 18 miners are at work there now. More laborers will soon be needed to do the work, and a large force will undoubtedly be employed there. A tunnel 300 feet in length has just been completed and the miners are beginning to drift out in different directions from it. An arastra has also been erected. A large number of people were in Smartsville Sunday, from Marysville, looking up mining matters. Other points around Smartsville have been prospected and favorable indications are observed. There is every probability that new mines will be opened soon. At any rate Smartsville has the best of prospects of again becoming the lively hive of industry that it was years ago, and that too in the near future.

## NEVADA.

## Washoe District.

**CONFIDENCE.**—Virginia Enterprise, May 14: The north drift on the 1000 level is in 328 feet, having been run 37 feet during the week. Are now shipping daily to the Brunswick mill 200 tons of ore, the battery samples of which average \$41.88 per ton.

**SAVAGE.**—On the 400 level the south drift has been advanced 19 feet, and continues in good ore. The southeast crosscut from this drift is extended 121 feet. The west crosscut from the face of the north drift on this level continues in fair-grade ore. Are extracting about 100 tons per day of ore of good quality from between the 400 and 900 stations, and are shipping about 70 tons per day to the Rock Point mill. Battery assays from the same average \$28 per ton.

**CHALLENGE.**—The raise is now up a distance of 88 feet, 10 feet having been added during the week. The joint Challenge-Jacket west drift on the 1000 level is in 91 feet, having been advanced 42 feet during the week. This drift shows ore of fair quality. The joint Confidence-Challenge north drift on the 1200 level is in 261 feet, having been continued 29 feet during the week.

**HALE AND NORCROSS.**—From the 600 and 700 levels have extracted the usual quantity of good ore. Have hoisted 1419 tons and have shipped to the Nevada and Mexican mills 1198 tons, the average battery assays being \$33.20 per ton. All the stopes are looking very well. Have bullion on hand for this month amounting to \$24,000.

**BEST AND BELCHER.**—425 level. From the bottom of the winze, 50 feet south of upraise No. 2, a west crosscut has been advanced 25 feet. Formation, quartz of little value. El Dorado tunnel: This company has extended the main west drift 59 feet. From this point a northwest drift will be advanced in our ground.

**BELCHER.**—Have run west from the top of the 1300 raise 35 feet since last report, in quartz yielding occasional fair assays. The connection between the 500 raise and the Crown Point winze has been completed, and a crosscut started west at the point of connection. The face is in good ore.

**SEG. BELCHER.**—The south drift from the upraise has been advanced 18 feet since last report. The

ground has shown no change during the week. The joint Belcher and Seg. Belcher repairs to the 1300 level lateral drift are progressing rapidly.

**WEST CON. CAL. AND VA.**—Sinking shaft making good progress going down through west side of vein and passing through strata of nice ore. Grading for foundation for steam hoisting plant is finished and machinery is expected to arrive to-day.

**CROWN POINT.**—The connection between the 500 raise and 400 winze has been completed and a crosscut started west at the point of connection. The face is in good ore. In the 600 east crosscut have raised 23 feet, all the way in quartz.

**GOULD AND CURRY.**—During the week there has been extracted from the 250 and 300 levels, and shipped to the Douglass mill, 224 tons and 600 pounds of ore, the battery assay of which averages \$25.41.

**POTOSI.**—No. 1 east crosscut from the south drift on the 550 level is in 27 feet in low-grade quartz. No. 1 west crosscut is in 32 feet, all in quartz. The south drift is in 498 feet. The face is in quartz.

**ALPHA AND EXCHEQUER.**—On the 122 level the north lateral drift is in 554 feet. The face is in porphyry and quartz. The west drift is in 12 feet in clay and porphyry.

**CHOLLAR.**—The north drift on the 650 level is in 100 feet, passing through low-grade quartz. The south drift is in 100 feet, all in quartz. North drift No. 2 is in 75 feet.

**YELLOW JACKET.**—The usual prospecting work is going on in all parts of the mine, and are extracting and shipping to the Santiago mill 100 tons of ore per day.

**BULLION.**—Are still crosscutting in the vein east and west on the 640 level. The east crosscut is out 71 feet and the west 75 feet—both being in quartz yielding assays.

**OCCIDENTAL.**—During the week have been digging a ditch and putting in a water-pipe from the Forman shaft tank to the mine. No work has been done in the mine.

**SCORPION.**—The south drift on the 300 level has been advanced 22 feet, making its total distance 255 feet. The face of this drift is in soft vein porphyry and clay.

**IOWA.**—South drift from McBee tunnel has been advanced 27 feet; total 65. The face still in quartz, clay and porphyry, showing some assays.

**UTAH.**—The south drift has been extended 65 feet; total length, 110 feet. The formation is porphyry, clay and quartz.

**ANDES.**—Drifting in quartz east on the 350 level and north on the 240. The latter drift encounters occasional bunches of ore.

**BALTIMORE.**—The pumps are working well and are lowering the water fast.

**ALTA.**—Are extracting the usual quantity of ore from the 1150 and 825 levels.

## Eureka District.

**ORE SHIPMENTS.**—Sentinel: The following number of tons of ore were shipped from the mines of the district to the furnaces during the week: Dunderberg, 111 tons; Union, 114 tons; Silver Lick, 214 tons; Fair Play, 314 tons; Geddes & Bertrand, 814 tons; Lord Byron, 18; and White Pine 1 ton. From the Margaretta, 13 tons; Altoona, 10 tons, and Oriental & Belmont, 43 tons.

**BULLION SHIPMENTS.**—During the week Wells, Fargo & Co. made the following shipments of bullion: Eight bars for Richmond Co., valued at \$16,710.85; passing bullion, nine bars, valued at \$130.30.

**RUBY HILL.**—Prof. Clarence King returned here after an examination of mining property at Hot Creek, last Wednesday evening, and departed for New York yesterday. It was reported that the eminent geologist had come for the purpose of visiting the Richmond mine in company with Mr. Probert, manager of the Richmond Company. We learn, however, that such was not the case, but they did visit the mine together, and from an interview with Prof. King a Sentinel representative learned that from what he saw in the mine, he has not changed his mind in reference to its future. He is still of the opinion that exploration should be continued on Ruby Hill to a further depth of 1000 feet or thereabouts, and that there is no geological reason why ore should not be found if such work is done. He is of the opinion that the ore will be more concentrated below the water level, and that in place of oxidized ore, a mixed more or less with limonite, gold-bearing arsenical pyrites and silver-bearing galena will be found in more compact and undecomposed form, and hence richer than that which the mine has already yielded above the water level. It would take more space than we can give in this issue of the Sentinel to quote all that the learned gentleman said on the subject, but in course of conversation he referred to the inadequacy of the present appliances for draining the water out of Ruby Hill, and said that a powerful line of Cornish pumps would be the right thing for that purpose. He has not the least doubt that the ore goes down below the water level. He approves of the Richmond drill work now under active prosecution, but would not consider a negative result as conclusive. Should the drill corps fail to indicate the presence of either of new ore bodies, or the downward continuation of the vein, he would not hesitate to recommend the employment of sufficient capital to sink and explore the ground by actual drifting. He regards Eureka as being practically a gold-bearing camp, inasmuch as he places the profits that arise from our mines to the production of that metal.

## Tybo District.

**LOOKING WELL.**—Belmont Courier, May 5: Thomas S. Grieves, superintendent of the Ma Alta of Tybo, informs us that this valuable mine never looked better. It is producing large quantities of good ore which is shipped to Eureka for reduction, and after paying all expenses, leaving a handsome profit to its enterprising owners—W. Dimick and L. S. Luse. This mine will give employment to a large number of men this summer.

## Taylor District.

**MONITOR.**—White Pine News, May 5: It was the general opinion here when the Eberhardt Company bought the Monitor mines, that a large area of virgin ground which the company owns would be explored and a valuable property opened up. But with the advent of the new company came inactivity of the duldest kind. Little if any new explorations



have been attempted. Its chief manager went off to Mexico and left the company's newly-acquired possessions in charge of his brother. He too flew the track after awhile and returned to his home in New England, leaving the property in charge of foreman Read, who, no doubt, has conducted the company's affairs as well as he could with the resources at his command. What the Eberhardt-Monitor wants to do with that portion of its property in Taylor district is active management, the prospecting of the ground for which they have paid a big price, less stock gambling and more honest work in its development. A private citizen who would invest his money in a high-grade property and treat it after purchase as this company's int rest in the Monitor mines have been treated, would be looked upon as an idiot and a guardian appointed for him. These remarks may not be palatable in certain quarters, but they are truth. Not an increase of shares, but more work is what the Eberhardt-Monitor Company's property in Taylor needs.

#### Wild Rose District.

THE PARADISE MINES.—*Silver State*, May 8: Nick Frayer reports all the mines at Spring City looking better than for some time past. New bodies of ore are being developed in the Paradise valley. The Cliff is producing rich ore, and some of the ore which Bell & Brannan are extracting from the Rattler assays 900 ounces of silver to the ton. The Cliff Company's mill is being put in running order, and it will be ready to start up about the 15th inst.

#### Gillis District.

HIDDEN TREASURE.—The Hidden Treasure mine is owned by Levi Smith of Belleville. The mine is considered the best paying proposition in Gillis district, notwithstanding the low grade of its ore, which is worth about \$40 per ton. The main shaft is down some 300 feet, and we are informed that there is hardly a drift or cut in the mine but from which large quantities of ore can be extracted. There is a small amount of ore on the dump, and should the contemplated reduction works be erected at Luning, a large force of men will be employed in and about the Hidden Treasure.

CRUSHING.—J. Faegan has 180 tons of ore at the Diablo mill, Sodaville, which he will have crushed. The ore is from his mine in Santa Fe district, and is expected to work about 100 ounces in silver to the ton. P. Gilfoyle made a shipment to the Diablo mill, of a crushing of ore from his mine in Huiches canyon, this county. The mine, the name of which is not known, is an extension of the old Indian Queen.

#### Marietta District.

PAYING.—*Esmeralda News*, May 9: There are now about a dozen men at work in Marietta mining district, this county, and from the following items obtained from a gentleman recently in from the district, it will be seen that the mines now being worked are all good paying properties. The gentleman informs us that there is room enough for at least 100 active men in the district, and that that number of men could find profitable employment in prospecting in and about Marietta. He says that some of the most valuable mines are lying idle for the want of capital and muscle to work them. Joe Moring and Frank Higgs, two old-time prospectors, are working on the Blackhawk mine and have the prospects of opening up a good property. Billy Cook, who recently started to work on a claim in the district, has about five tons of good-grade ore at the Diablo mill, Sodaville, waiting an opportunity to have it crushed. T. Mackey made a shipment of a carload of ore to Selby's Reduction Works last Thursday. He estimates that the ore will work between 60 and 70 ounces of silver, 50 per cent lead and 55 in gold per ton. Bradley & McClellan, owners of the Big Elephant mine, had a lot of ore worked at the G. Argene mine, Candelaria, last week which work about 200 ounces of silver to the ton. They are now at work taking out more ore, and expect to have another crushing ready in about five weeks. F. Magnire, the indefatigable prospector, shipped a carload of ore to Selby's works last Thursday. Frank is confident that his ore will work about 75 ounces in silver and 60 per cent lead to the ton. He has a good mine with a well-developed ledge, and is highly elated over his prospects.

#### ARIZONA.

CASA GRANDE.—*Florence Enterprise*, May 5: The Silver Bell property has been worked on for several years. Several shipments of ore have been made, netting a good profit. The main shaft, No. 1, on south end of claim, is down 72 feet, with good ore in the bottom. At a depth of 30 feet drifts were run each way 45 feet. Here the ledge is 1½ feet wide. Shaft No. 2 is down 45 feet with drifts in bottom, with a showing the same as in shaft No. 1. On the dumps of this claim are a good many tons of low-grade ore. This is one of the good claims of the district and will pay any practical man to work.

INDEPENDENCE.—This is an extension of the Silver Belle on the south. A shaft was sunk 50 feet on the north end of claim on the same ledge as the Atlantic, with results satisfactory to the owners. The continuation of this ledge is traceable for one-half mile to the Chicago. On this claim is some showing. The ores here are 40 per cent lead. These properties are owned by Messrs. F. C. Minshall and Ed Bien of Casa Grande.

AROUND PRESCOTT.—*Journal-Miner*, May 9: Miners are still in demand. Ahab Owen and partners are running their mill in Mint Valley. Frank Alters continues to ship ore from a claim on the Hassayampa district. Coke is expected to commence arriving for the United Verde smelters next Tuesday. Two carloads of ore were shipped on Tuesday and one yesterday from the sampling works. Captain Brann has been employing men to work on his gold property in Turkey creek. E. G. Campbell has decided to Dan O'Boyle for \$500 the Cubb mining claim in Hassayampa district. Clark & Adams think of putting up five stamps to run in connection with their sawmill to work custom ore. F. M. Murphy sent six more miners out on this morning's stage to work on the Congress mine at Martinez. Chas. A. Girdler, the mining man, is in town from Turkey creek, and reports miners all active and doing well in that district. Fisher & Duikie continue to pile up ore on the dump of the Scotch Lassie, and have now 15 tons awaiting shipment to the sampling works. It is stated that San Francisco parties will shortly erect a mill to work the ore from Frank Ryland's mine, near Min-

nehaha Flat. This is one of the most promising gold properties in this section. Mrs. Randolph has five men now employed on the Randolph claim, in Turkey Creek district, taking out rich ore. This claim is looking splendid, a large portion of the ore going 800 ounces in silver. J. J. Williams, superintendent of the Copper Basin Copper Company, arrived on last evening's train and assumed the charge of that property to-day. He will commence preparations at once for the erection of the smelter.

#### COLORADO.

SALE OF THE LUCY GROUP.—*Georgetown Courier*, May 3: The Lucy Group Mining Co., composed of A. J. Minord, E. H. Foster, L. W. Hubbell, G. A. C. Woolley, D. L. Griffith, J. R. Miller, James Abbott, F. E. Headley, G. D. Milligan and W. G. Porter, with the exception of Mr. Foster, all of Springfield, Missouri, on Monday evening, April 30th, closed the sale of the Lucy Group of mines, buying the same of the John Moore estate and Joseph Trudeau for \$35,000 in cash. The property consists of the Lucy, Seneca, Dewdrop, Charmer, Lady Elgin, Ohio Belle, Savannah, Roanoke, Confidence and Wyoming, each full-sized claims, 1500x150 feet, and embracing an area of about 50 acres of valuable mineral land. The main vein is an immense fissure and covered by the Ohio Belle, Lady Elgin and Dewdrop locations, giving 4500 feet on the vein. The Lucy, Roanoke and Savannah are practically parallel veins, while the Confidence, Wyoming and Seneca are cross lodes. During the past winter ten men have been constantly employed on development work, the incorporators having spent at least \$10,000 in opening the lodes, and the result has been such that the bond was closed at once.

NORTH PARK GOLD-FIELDS.—*Denver Tribune-Republican*, May 11: Northern Colorado gives evidence of enjoying quite a gold-mining boom this season. The country has long been known to contain valuable lode veins and auriferous placers, from which much has always been expected. Among the older prospectors in this State, not a few are to be found who have explored the country, and all agree that it contains unusual resources that can be worked to a profit with modern appliances and on an extensive scale. The latest discoveries reported are in the Independence gold district, where a number of quartz lodes are now being opened and arrangements made for the erection of one or more gold-mills. All through Douglas and Lincoln gulches miners are at work, and Laramie City expects to profit considerably by the interest taken in the mineral resources of North Park. The country about Hahn's peak has long been famous for its vast beds of auriferous gravel, and very little booming will be required to turn the attention of old placer miners to that district. Unfortunately, however, it is not generally a poor man's camp, as successful mining operation will have to be preceded by a considerable outlay of money. The gravel beds, as a rule, are above the existing stream, and in order to work them on an extensive scale, ditches and flumes for the conveyance of water will have to be built. With sufficient capital there is no question but that placer mining would return handsome profits, and it will not be long before some of the best deposits and water privileges will be appropriated and work begun on an extensive scale.

CONCENTRATING.—*Georgetown Courier*, May 12: The Black Hawk concentrating machines are, in point of simplicity, economy and general results, the best machines that have yet been tried upon ores. Other machines may do better work on certain classes of ore, but they are more expensive to start with, easy to get out of order, and require an expert to handle them. Hence as an all-around machine the Black Hawk tables are the best introduced in this camp, and a number of our mining men have realized this fact and strongly favor the erection of such works at their mines. Messrs. Hartzell & Woodward, at the Clear Creek mill, have put through about 200 tons of cobblings from the Corry City mine, concentrating 10 tons into one, and handling from 10 to 12 tons a day. The concentrates have been milling over 200 a ton, and they claim to save about 75 per cent of the values in the crude material. When it is taken into consideration that every mine produces an abundance of concentrating material, there is certainly an inducement for the investing of large capital in this direction.

#### IDAHO.

PRIDE OF IDAHO.—*Ketchum Keystone*, May 5: The Pride of Idaho mine, situated on the east fork of Wood river, in Warm Springs creek mining district, changed hands on the 3d instant, the sale having been consummated at that time by General J. B. Winters between the owner, J. W. Davison, and Kansas City parties represented by W. G. Gates, who is here and has taken possession of the property. The price is \$40,000, of which a portion has been paid in cash and the balance is to be paid in a short time in installments. This may be considered an important transfer of mining property, as the Pride of Idaho has been thoroughly developed by years of hard labor by the owner, and has always been self-sustaining, notwithstanding the great amount of deadwork carried on to make it a mine.

SHEEP MOUNTAIN.—*Challis Messenger*, May 8: The new mining district of Sheep Mountain lies about 125 miles northwest of Hailey, and, as near as can be determined, is located in the southeast corner of Idaho county, although Custer claims it as within her borders. The district is an extensive one and has been divided into three subdivisions—Sheep Mountain, Greyhound and Sea Foam. The ores of the latter are free milling, while heavy galena and carbonate ores prevail in the others. While the Sheep Mountain country has been more or less talked about for several years, the real extent and richness of the new mineral field was not fully realized until last summer, when the result of the season's work developed the fact that at least a dozen of the claims gave every assurance of becoming permanent mines and producers of a good grade of ore in large quantities.

GOLD BELT BULLION.—*Wood River Times*, May 9: A gold brick worth \$1000 has been brought in from the Camas No. 2 mill. This was the result of the last five days' run, of 15 stamps of the mill. The ore run through during that time yielded an average of \$10 to \$12.50 per ton, on the plates only. The complement of 20 stamps could not be run because

of the lack of water, neither could any sulphurets be saved, for the same reason.

A SUCCESSFUL TEST.—A working test of ore from the Welch group of claims, on the Gold Belt, has just been made at the Camas No. 2 mill, for Colonel Barr of Kansas City, who was here a week ago, looking at the claims referred to. The ore yielded an average of \$15 60 per ton in free gold. This ore was from the very surface, and shoveled into wagons as it lay on the dump, without any sorting whatever. The test is therefore satisfactory. Something remarkable about the ore is the almost entire absence of sulphurets. This gives plausibility to the statements made last year, to the effect that the ore is less base, the gold freer, toward Beaver creek than it is in the claims adjacent to Rock creek.

THE HUB MINE.—*Wood River Times*, May 9: Colonel Bullentine and Sam S. Wilson of Muldoon, who came in yesterday to procure a hoisting engine and pump for the Hub mine, situated six miles this side of Era, have purchased the little rig formerly used at the Guy mine, which is of sufficient capacity to sink to a depth of 300 feet. By using this rig the lower tunnel on the Hub can be connected with the surface, and the workings continued at least 150 feet deeper. This, the gentlemen think, will sufficiently prospect the mine to demonstrate its value.

#### MONTANA.

SAN FRANCISCO.—*Phillipsburg Mail*, May 5: The gratifying developments of the past week are of such a nature as to place this property in the first rank as a prospective bonanza, and the feeling among mining men throughout the district is one of intense satisfaction that the enterprise has passed out of the problematical state it has been in for so long a time. We have no hesitation in saying that the present showing in the workings of this property makes it entirely certain that the San Francisco is a permanent and valuable mine. The 5 feet of low-grade ore recently encountered in the east drift of the 200-foot level was found on the north side of a slip or crevice that came in at that point. This spur or offshoot made so rapidly to the north that it was given up early last week and driving on the south side of the slip, which had been commenced and discontinued, was recommenced, and last Saturday the edges of the ore body constituting the present strike were uncovered. The pay-streak of the new find is 2 feet in width and assays from 400 to 1100 ounces to the ton. The most gratifying feature of this new development is that it was expected beforehand, the running of the east drift on this level being for the purpose of encountering the rich chute of ore uncovered by the winze on the 100-foot level, and that this present find is none other than the same chute is proved by similarities in the ore, gangue and vein-structure and casing which there can be no mistaking. That the ore was encountered some 75 feet sooner than expected only goes to show that the chute is widening (in the direction of the strike of the vein) in depth, and widening rapidly. At the 400-foot level the crosscut is being continued, because, although some good quartz has been encountered, the management is in some doubt as to whether it is the vein proper or a spur or filled-in crack or offshoot. When this matter is definitely settled the drifting will be actively pushed on the vein.

RED BLUFF.—*Cor. Bozeman Chronicle*, May 9: There is more quartz on the dumps of this camp at present ready to be worked than there has been at any time for the last ten years. In the Grubstake, the boys have struck the best and biggest shoot of ore ever discovered in that remarkable lead. Eighteen inches of 300 rock is not a thing to be sneezed at. Pope, Balless & McKee are highly elated over their big strike. William Reese and his partner are working in the Boas, getting out ore. In the Apalachee, Jack May and John Harper are at work taking out ore. The boys had remarkable luck there in drifting for development. They came across a shoot of ore of a very high grade—\$80 per ton (the Apalachee is altogether free milling), and they are taking it out now at the rate of about a ton per day. Geo. Badgett is working on the Red Bird. He has a big pile of quartz on the dump and also in sight in the lead. Jim Kelly and Dan O'Shea are working on their lead, the Tigris, in silver ore—about 18 inches of rock, assaying \$150 per ton. Carren Adams and Hader own the Elkhorn, not far from the Tigris, and had some assorted ore shipped that went 180 ounces of silver to the ton. W. P. Grannis, who has been prospecting in the same neighborhood, has lately discovered a lead that shows a good deal of native silver. "Old Haines," who is a well-known character in our camp, also has a large amount of quartz, and expects to have quite a run of ore through the mill. The mill here is admitted by all to be a success. It is running right along, and gives employment to a number of men at good wages. The Ayox has been represented, and there is a good streak of very rich ore in the shaft. R. H. Foster and Chas. Holdman lately took up some placer claims, and have demonstrated to their own satisfaction that there is much money in their claim. The great trouble appears to be about a sufficient water supply, but they have made arrangements with parties here that will give them all the water they need, and by another season their ditches will give them water enough to work the ground by piping it.

#### DAKOTA.

LEACHING WORKS.—*Deadwood Pioneer*, May 5: An official visit was yesterday paid to the old smelting grounds below the city by Prof. R. D. Clark, John P. Belding and Harris Franklin of the Deadwood Reduction Company, and engineer Thomas H. White, who has been employed to establish grades preparatory to erection of the leaching plant. The grounds are admirably adapted for the purpose and but little grading will be found necessary. The title still rests in the old smelting company upon which organization has never been perfected. Mr. Franklin yesterday looked up stockholders, however, and began obtaining consent to relinquishment of title to the new company. This was readily given, as no disposition exists to put a stumbling-block in the way of the enterprise, upon which so much hinges. Work on the plant will commence at some date within the very near future; probably immediately on return of Professor Clark from Rapid, when subscribers of the reduction company will hold a meeting, and perfect organization by electing permanent directors (probably the charter members of the board now exercising executive powers satisfac-

torily), and adopt a code of by-laws. When work does begin it will be prosecuted continuously and uninterruptedly until the plant is completed.

THE QUEEN BEE.—*Black Hills Pioneer*, May 12: Captain Fred H. Griffin came down yesterday from the Queen Bee. The ten-stamp mill is now pounding away steadily on ore from the mine, crushing about 18 tons per day. The concentrators are said to work well, and Captain Griffin is confident that the problem of successfully working the ore has been solved. It is the intention to continue the operations and possibly ere long add to the capacity of the mill.

THE FAIRVIEW.—The Fairview mill, on Little Rapid creek, which was shut down for a time, is again in operation. So far as the ore from the Basil and Fairview has been worked, it has yielded a good profit, and the success of the enterprise has done much to strengthen confidence in the mines of the Central Hills generally.

FLOAT.—Henry Keimer is mining for silver in Go-to-Hell gulch, above Central, and thinks he has the richest find yet made in the hills. He is only in 20 feet, and yet has a three-foot vein of ore that assays from 130 to 140 ounces. The vein seems to be vertical and a true fissure, with porphyry on one side and quartzite on the other. Central City will yet be a prosperous mining camp, as in the early days.

#### OREGON.

SPARTA MINES.—*Bedrock Democrat*, May 12: The *Democrat* reporter yesterday met and conversed with Major Ira B. Schenck, the mining man who recently returned from a visit to the mines of Sparta and Snake river. Of the mines in and about Sparta, Major Schenck speaks enthusiastically. The Del Monte mine, controlled and operated by Dr. Lewis, is one of the most promising mining properties he has seen for years. The main tunnel is in over 200 feet on the ore vein which in width fills up the tunnel. The ore is high grade, mostly gold sulphurets in character, is very favorably situated for easy handling, and consequently cheap working. The extent of the ore body is hard to estimate, it being so extensive that thousands of tons are in sight. The Del Monte is no longer a prospect but a well-developed mine. Capitalists in search of a valuable mining property should turn their attention to the Del Monte. The Major says they will find it all a thorough mining man can ask for. Other locations of the Del Monte group of mines show well for the amount of development work accomplished. A large amount of ore is in sight, and very favorable tests have been obtained by the assay process. The Major is of the opinion that Sparta will eventually be one of the largest bullion-producing camps of Eastern Oregon, and this opinion is one of great value, coming as it does from a man whose knowledge of mines and mining is conceded to be second to that of no expert on the Pacific Coast.

#### UTAH.

REVIEW.—*Salt Lake Tribune*, May 11: The week has been one of unusual quietness, and the aggregate receipts have been light by the bank. The receipts in this city for the week ending May 9th, inclusive, were to the aggregate value of \$72,508.18, of which \$37,352.74 was bullion and \$35,155.44 was ore. For the previous week the receipts were \$220,748.57, of which \$44,934.80 was bullion and \$175,813.77 was ore. The Ontario output for the week was from ore sales, \$10,263.13; no bullion. The Ontario produced for April, bullion, \$5,377.21 fine ounces; by ore sales, \$73,476.55; an approximate total of \$158,853.76. The Daly product for the week was 8868.18 fine ounces of bullion; no ore sales. During the week there was received \$1700 in gold bars and \$8668.18 in bars of fine silver. The Hanauer smelter produced during the week bullion to the value of \$8080; the Germania \$18,704.56. Ore receipts in this city for the week were \$11,990, by Wells, Fargo & Co.; \$5800 by McCormick & Co., and \$17,365.44 by T. R. Jones & Co.

#### BRITISH COLUMBIA.

CAYUSE CREEK MILLION-DOLLAR MINES.—*Indian Sentinel*, May 9: The work of opening up the Bonanza claim goes slowly on, the shaft being down some 50 feet. The company have had altogether some 20 mill tests and assays made, which show an average test of \$60 to the ton. Four recent assays from various portions of the ledge are as follows: One from the shaft at a depth of 50 feet, 108 gold per ton; one taken from drift off ledge, 90 gold per ton; one from croppings, 800 feet above ledge, \$36 in gold; another from croppings, \$38 in gold. In the assays made no one has been devoid of a gold return. The owners are more confident than ever of the worth of their mine, especially since a Denver expert who visited it, stated that there was from \$300,000 to \$400,000 worth of ore in sight. Nothing short of a million dollars will now purchase the properties owned by the company.

OFF FOR MONTE CARLO MINE.—Messrs. F. A. Ingham and George McDonald, owners of the Monte Carlo mining location on the North Thompson, left here Monday with supplies for three months' prospecting and development work on the property, which is situated about 200 miles north of Kamloops. An assay of the rock from this location made at Ottawa last fall showed 4½ ounces of gold and 21½ ounces of silver to the ton.

KAMLOOPS COAL MINES.—During the past week there has been considerable excitement in town over the reported discoveries of coal seams near Guerin's ranch, about four miles southwest of town, and on Thursday last representatives of the *Sentinel* visited the location. There is pure coal in Kamloops and apparently millions of tons, but the amount can only be determined by further tests. Two tunnels have been drilled into the leads at the coal mines, one by Mr. Guerin and the other by Mr. G. Loney. The tunnels are already in some 30 feet and have cut across several seams of coal running from some inches to three feet. Mr. Loney is drifting west by north from the gulch and is taking out coal in a fairly pure state, several parties having built fires and burned it at the mine. Mr. Guerin is drifting on the seam south by east, and intends sinking a shaft when he has tunneled the mountain several yards further. There has been great excitement over the discovery and numerous claims have been taken up, the country being staked off for some miles on either side of the gulch.



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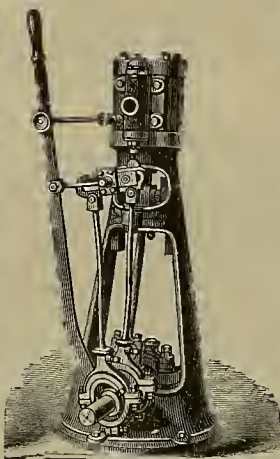
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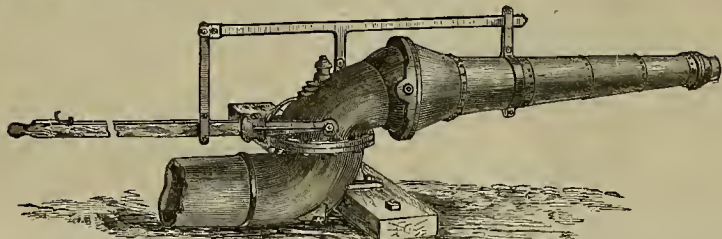
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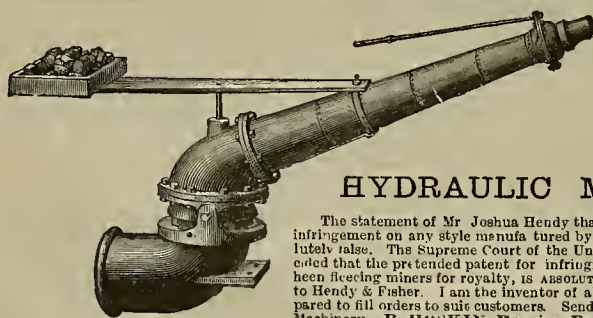
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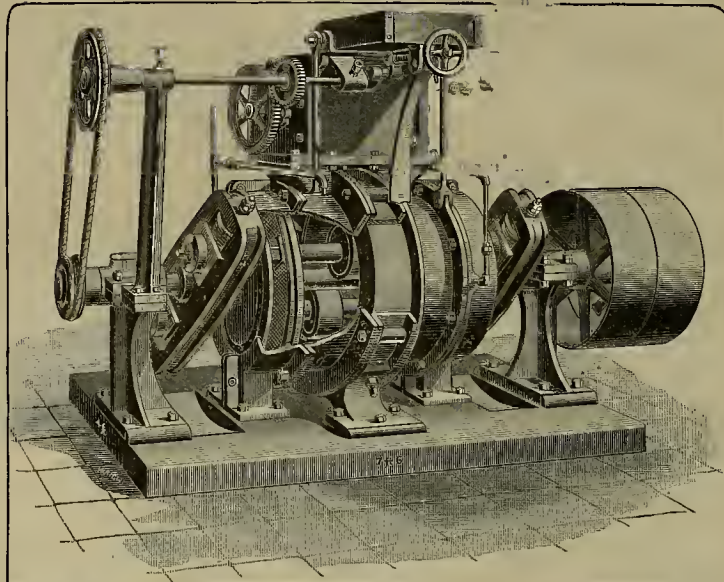
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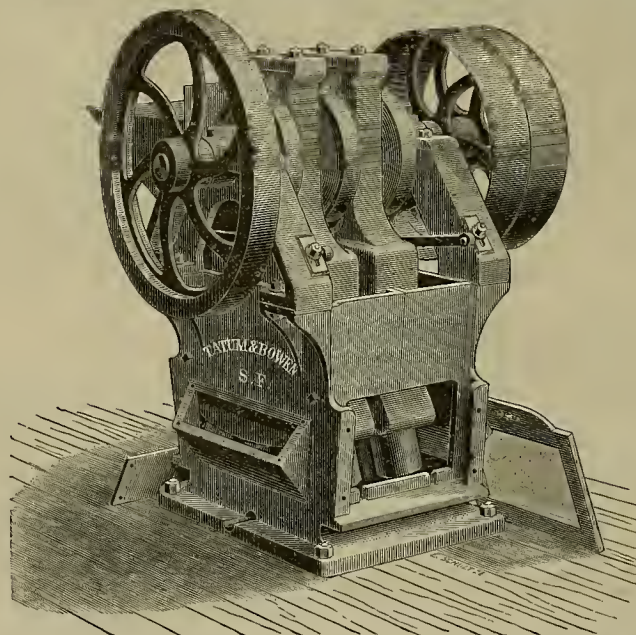
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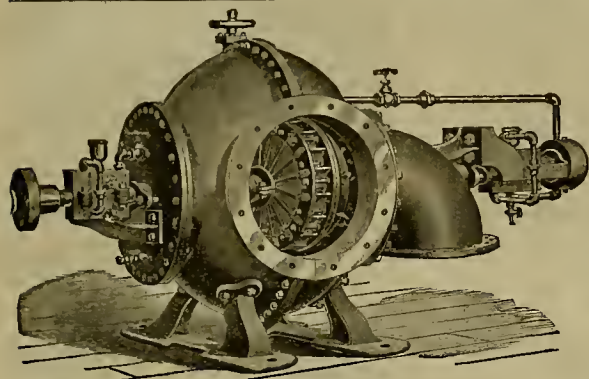
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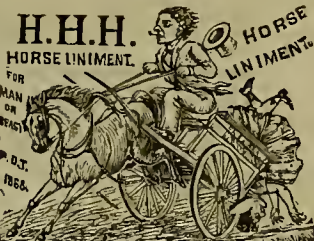
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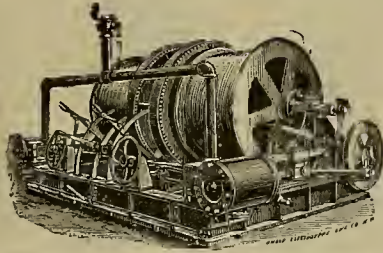
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## DELINQUENT NOTICE.

Butte Creek Hydraulic Mining Company.  
Location at principal place of business, 213 Market St., San Francisco, Cal. Location of works, Butte county, California.

NOTICE—There are delinquent, upon the following described stock, on account of Assessment No. 12, levied on the 27th day of March, 1888, the several amounts set opposite the names of the respective Shareholders, as follows:

Names.	No. Certificates.	Shares.	Amount.
Ed. Dexter.....	80	500	\$ 25 00
Chas. Morse.....	92	500	25 00
B. Frank Morse.....	90	500	25 00
Ed. D. Rue, Tr.....	102	2900	145 00
Ed. D. Rue, Tr.....	104	100	5 00

And in accordance with law, and an order of the Board of Directors, made on the 27th day of March, 1888, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Market street, San Francisco, Cal., on Monday, the 28th day of May, 1888, at the hour of 1 o'clock p. m., of said day, to pay Delinquent Assessments thereon, together with costs of advertising and expenses of the sale.

LOUIS R. LEVY, Secretary.

OFFICE—213 Market St., San Francisco, Cal.

## MEETING NOTICE.

Office of the Alabama Mining Company,  
Corner of Fifth and Stevenson streets, San Francisco, California, May 12, 1888. Location of works, near Newcastle, Placer county, California.

NOTICE is hereby given to all the Stockholders of said Alabama Mining Company (a corporation) that there will be a general meeting of the Stockholders of said company held at the office of said company at the S. W. corner of Fifth and Stevenson streets, in the city of San Francisco, Cal., on Monday, the 11th day of June, A. D. 1888, at the hour of 1 o'clock p. m. of said day, for the purpose of removing from office the following named Directors of said company, to wit: Owen King, William Reinhold, Samuel Jones and Michael Hoffman, and for the further purpose of filling by election then and there the vacancies that may be caused in the Board of Directors by such removals.

The undersigned is the owner of more than two-thirds of the capital stock of said corporation, as well as a Director and President of said Company, and makes this call under the provisions of Section 310 of the Civil Code.

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President of the Alabama Mining Company.

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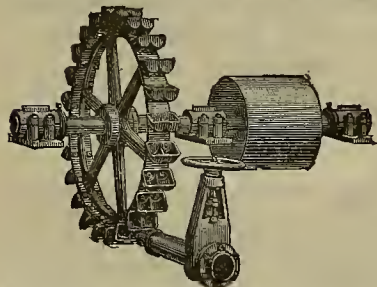
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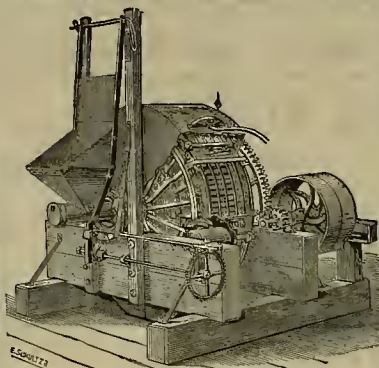
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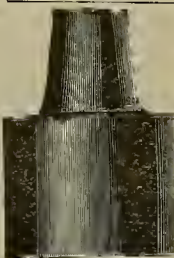
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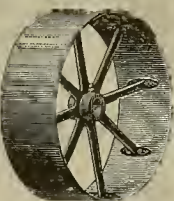
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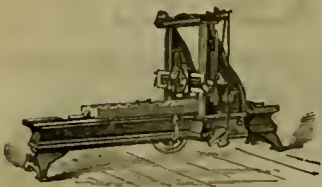
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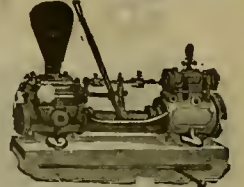


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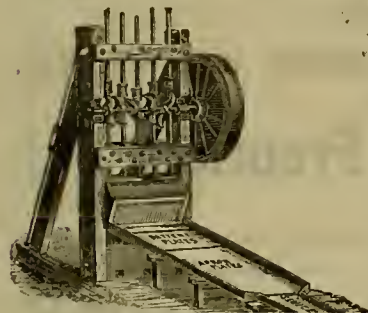
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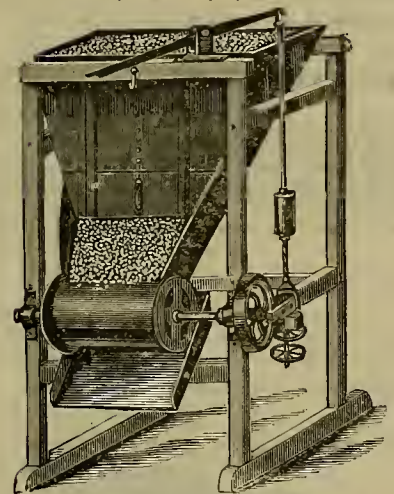
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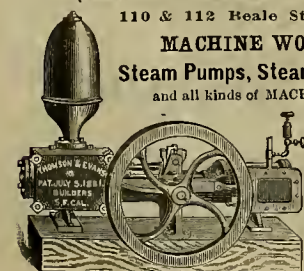
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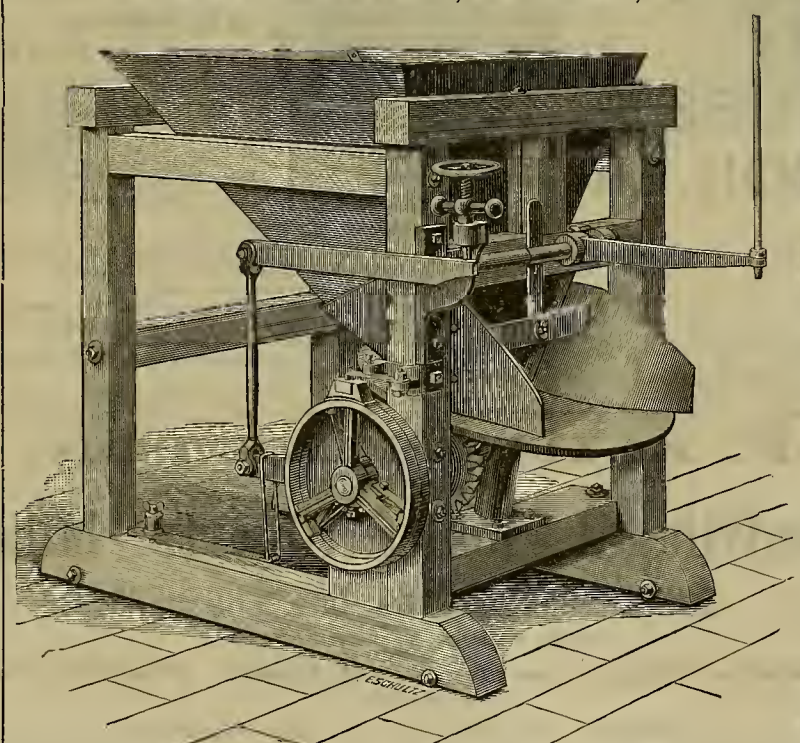
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J. R. TREGLOAN, Supt. South Spring Hill Gold Mining Co., Amador City, Cal.  
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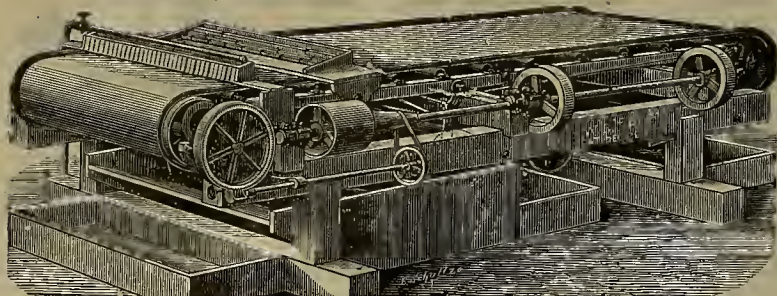
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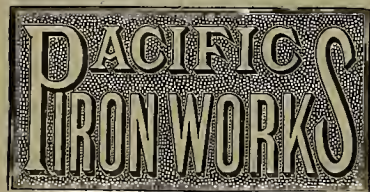
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N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

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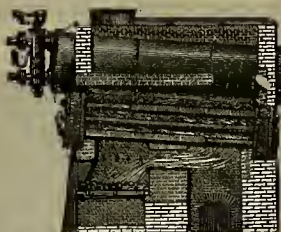
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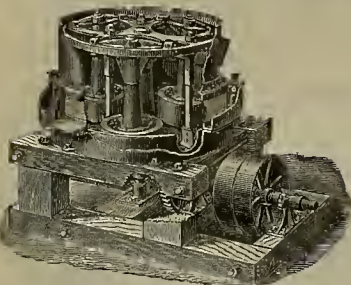
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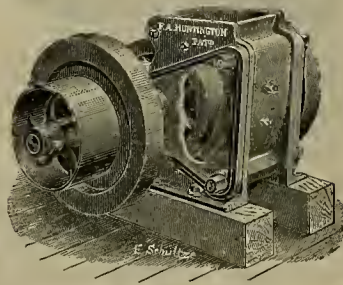


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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, MAY 26, 1888.

VOLUME LV.  
Number 21.

## The Pelton Water-Wheel.

From the time the memory of man runneth, the rivers flowing westward from the great Sierra Nevada range have been wending their way down the mountain canyons and through the valleys and plains, without thought of utilizing the vast resources they afforded. Upon the first discovery of gold on this coast, water was found to be an element of prime necessity in all mining operations. At first its use was confined to the working of cradles and running sluices. When the era of quartz mining came in, it was found equally necessary in all reduction processes, even before thought of as a source of power. To make it available over any considerable extent of country, it was necessary to divert the streams from their natural channels, and bring them down on the divides that separate all the great water courses, at such an elevation as to command a large extent of country. Early in the fifties, many ditch and canal enterprises had been inaugurated, which have been constantly multiplying and enlarging, so that all that portion of the State bordering the foothills is now covered by mountain streams, affording water facilities of inestimable value, both to the mining and agricultural interests.

It soon became evident that water so generally distributed ought also to be made a source of power in mining operations, and thus dispense with costly steam plants. How to utilize it with such high pressure and in an economical way was the problem. No turbine wheel was adapted to, or had ever been run under such conditions.

As has been generally the case when a great want exists, means have been found to supply it. Several years of persistent experiment developed what is known as the "Pelton wheel," illustrated on this page, and which is now running a great deal of the mining and manufacturing machinery on this coast where water-power is available. Its great value to mining and industrial uses is now universally recognized, and it is coming largely into use in all parts of the world.

The first application of this motor was at the Idaho mine, at Grass Valley, Nevada county, some seven years ago, where a test was made of the various wheels in use to determine their relative value. The Pelton developed at this test over 90 per cent of efficiency, and was so far in advance of all competitors that it was immediately adopted by that company. Thirteen of them were at once put in to run their

mills, hoists, pumps, air compressors, etc., in fact affording all the power for these extensive works. During all this period no break-downs or delays of any moment have occurred, though the pumping and hoisting has been carried to a depth of 1600 feet.

It may be stated in this connection, illustrating the value of such a power, that the Idaho Company spent some \$45,000 in bringing water to their works, which amount was almost covered by their first year's run.

power cannot be availed of. To show what is now being done in this way, the Big Bend Tunnel Co. of Butte county, operating on the Feather river, are putting up an electrical plant, transmitting power over an 18-mile circuit, for the purpose of running pumps and hoists, the power being furnished by a Pelton wheel located a mile below the outlet of their tunnel.

The Chollar mine of Virginia City is also putting in a Pelton wheel at the Sutro tunnel level of their shaft, to be run under a

## Stamps and Roller-Mills.

Although there was a conservative prejudice against roller-mills for crushing quartz when they were first introduced, this has gradually disappeared, as their utility has been proven. Many men thought that under no circumstances would these mills take the place of the old stamps, but they have done so and have even excelled them in many instances. Roller-mills are not the most economical under all conditions by any means,

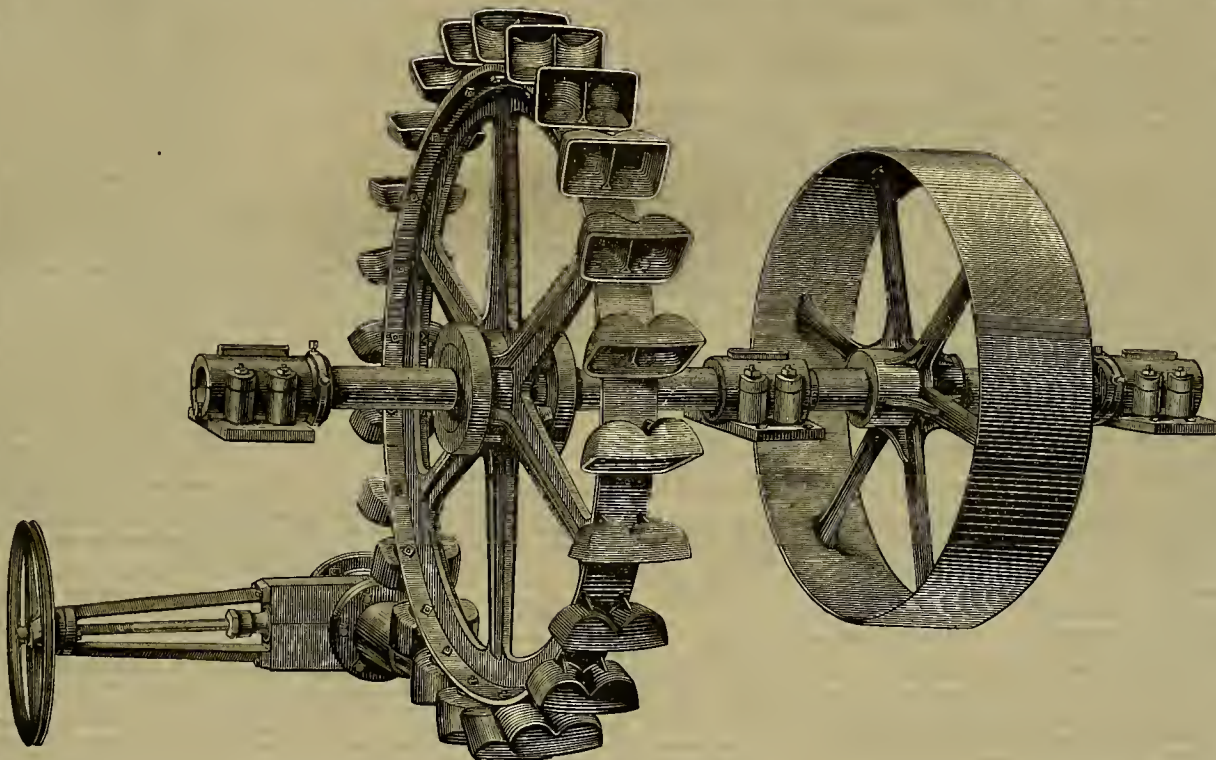
but the same thing may be said of stamps as well. Under certain circumstances the roller-mills will give better results than stamps. Where the ore is soft or friable, and large quantities are to be handled, the roller-mills will do good work and show large capacity. Witness the results at the Spanish mine, Washington township, Nevada county, where they are working gold ore cheaper than anywhere in the world. They use roller-mills at that mine and make a profit out of rock worth only 65 cents a ton. This is a record that stamps have never made.

There are places now where stamps are used, and where rollers would give better satisfaction. An instance may be cited in the case of the Signal mill, Arizona,

where they have very soft ore much resembling that of the Spanish mine referred to. It is soft and easy to crush. Yet heavy stamps are still used to work it, though roller-mills could treat larger quantities at very small cost.

Of course in most cases the old stamp is best, but with soft ores, in quantities, the roller will show more economical results. And for prospecting operations, in opening new mines, etc., any of the cheaper appliances for ore crushing will answer very well. There are several varieties of the roller-mills, rocking-mills, disk-mills, etc., which answer their purpose very well, and cost little as compared with the stamps. As stated above, the prejudice against these improved appliances is rapidly disappearing, as is proven by the increased sales reported of late by the various manufacturers in this city. They are not only in use on this coast, but are being shipped to Australia, Africa, Mexico and Central and South America.

THE Juneau (Alaska) Record says: "The Ancon brought up a couple of Chinamen and lauded them on Douglas island. This piece of news soon reached Juneau and a committee of about 30 miners visited the island and notified the proper persons that the Chinamen "must go," and they went on the return of the Ancon from Sitka.



THE PELTON WATER-WHEEL.

The advantages of the Pelton wheel as a motive power are so many and so obvious that large expenditures are now being made by many companies in bringing in water to make this power available. It is no exaggeration to say that this marvelous little motor has effected a complete revolution in mining operations wherever it has been introduced. The cost of working low-grade ores has been so greatly lessened that many mines are now being worked with substantial profit, which had to be abandoned years ago under the too expensive system of steam-power.

One of the most interesting and important applications of power now attracting wide attention is that of utilizing water-power from distant localities by means of electrical transmission. In many cases the source of power is too remote to be availed by the ordinary system of ditching or piping, or cannot be obtained at points where required with sufficient head.

The advances that have recently been made in electrical transmission warrant the belief that power will soon be carried in this way, at least 20 miles, with comparatively small loss. Many electrical companies are now guaranteeing to transmit from 60 to 75 per cent of the primal energy developed a distance of from five to ten miles. By this means there are few localities in the country where the advantages of water-

1500-foot head, which is to drive five dynamos of 100-horse power each, the power thus developed being conveyed to the surface and then to their mill some half a mile away.

The magnitude and extent of operations of this character which are being projected or in course of development will soon convince the most skeptical that, though electricity is a rapid courier, when we come to understand how to harness it to its work, it is destined to do most of the heavy hauling of the world.

The business of the Pelton wheel has recently been put into an organization known as "The Pelton Water-Wheel Company," and will hereafter be conducted in this city at 127 First street, under the general management of Mr. A. P. Brayton, Jr., with Mr. L. A. Pelton as consulting engineer.

WALTER J. COLLINS, a well-known mining man, formerly foreman in the Justice mine, who has lately been employed as superintendent of the Benton Consolidated Mining Company, has been arrested on a charge of forgery, perjury and embezzlement. The president of the company, John T. Hill, who caused the arrest, says that Collins has been carrying dum-mies on the pay-rolls and crediting men with more by twice than they really made, and that he has forged orders on the company.



## CORRESPONDENCE.

We admit, unadorned, opinions of correspondents. - EDS.

## The Wail of the "Tenderfoot."

[Written for the PRESS by M. A. GATE.]

O Boss of the mining scheme! what can you offer  
To brace up a tenderfoot's faith in the game?  
Where he staked every dollar he had in his coffer,  
And patiently waits for a boom on the claim?

Tidings from Gilead bear they no solace?  
Bring they no balm for the soul?  
Are we no nearer the end of the struggle?  
See we no clearer the goal?

Oh! where is the gold that shines as the noonday?  
Where is the silver that gleams as the star?  
Have the bright apples that blushed in the sunrise  
All crumbled to ashes and scattered afar?

See we no longer the smoke of the smelter?  
Hear we the din of the stamp-mill no more?  
Rings out no sharper the clink of the chisel  
Drilling the granite in quest of the ore?

Hear we no rumble of carts in the tunnel  
Deep in the mountain, dark, dismal and cold?  
Comes forth no quartz bearing three hundred  
ounces?

No carloads of gravel all glittering with gold?

Must the hope of vast wealth forever be banished?  
How fleet are the years! How we're all growing  
old!

Dreams of great riches, how soon are they vanished!  
How sorely we need a few ounces of gold!

## Montana Mines.

[From our Correspondent, R. G. HUSTON.]

## The Dogtown District

Is a new discovery 18 miles southeast of Elkhorn, and its euphonious name comes from the fact that it is a regular prairie-dog settlement. The Summit mine, the first discovery, is owned by Messrs. Allen & Carpenter. A shaft is down 65 feet and they have a ledge of 34 feet of ore with assay value running from \$50 lead and silver up to \$200 per ton.

## The Blackhawk.

Owned by Morris Broe, has a shaft down 60 feet and from five to six feet of ore. This is not as high grade as the Summit, but is a very flattering prospect.

There are a number of other locations, the Silver Safe, Montana King, Mountain View, Blue Bird, Silver Bell and McAuliffe. Work will be commenced on all of these during the next month. The district is certainly a promising one. It lies on the bench land between Crow creek and Boulder, and a railroad is to run from Three Forks to connect with the Boulder valley branch at Boulder, which will run within a stone's throw of these mines. If they prove continuous they may be considered virtually poor men's mines, and will yield to the general prosperity of Jefferson county. It seems almost like a romance that mines should be discovered here when miners have been traveling back and forth for 20 years and no one ever thought of mining being there.

## Big Foot District.

This is another of Montana's new mines, and is also in Jefferson county. It was discovered about six months ago, and developments are going on every day. The location is on the headwaters of White-Tail-Deer creek, 10 miles southwest of Boulder and directly tributary to the county-seat.

The Big Foot mine is an incorporated company. They have a shaft down 75 feet, and have crosscut to the ledge. Levels have been run on it for some distance. They have a large body of ore which assays from \$100 to \$200 per ton. Development work is being pushed as rapidly as possible, and the company are desirous of proving the value of their property this season.

## The Grizzly.

Owned by Vining Cook and Fred Berendes of Boulder, is bonded to Starret of Wickes (who is supposed to be operating for Hauser and others of Helena) for \$20,000. A shaft is down 60 feet. They have a ledge of ore three feet in width, averaging from 30 to 40 ounces silver, and 50 per cent lead. The parties holding the bond are experiencing considerable trouble with the water. It is almost an impossibility to prospect a mine to any depth without pumping facilities.

## The Alida.

Owned by Williamson & Gaffney, has a shaft down 30 feet. There is a large vein eight feet wide, with one foot of solid ore assaying 30 to 35 ounces silver and 35 to 40 per cent lead, making it a profitable ore and a mine that will develop itself.

## The Summit Mine.

Owned by Williamson, McDonald and others, has a shaft down 100 feet. The owners crosscut at the 50-foot level, and have three feet of quartz and galena which assays silver and lead \$90 per ton.

## The Lucy

Is owned by Anderson, McGee, and others. A shaft is down 50 feet, and they have 18 inches of galena ore carrying 40 ounces of silver and 40 to 50 per cent lead. Taken as a whole, these two new points of interest have made a fair showing for the amount of work done. Of course, the coming season will prove the merits

of them to the owners' satisfaction, and some of them are likely to prove veritable bonanzas. The Montana miners need not take any wild-goose chases after some jack-o'-lantern prospect in Alaska or South America, for they have plenty of good undiscovered mines, and many that have been discovered that are as yet undeveloped.

## Inyo County Mines.

EDITORS PRESS:—At Owens valley, near Little Lake, a gold ledge has recently been discovered about two and a half to three feet in width which shows free gold quite plentifully, and no doubt will pay handsomely with proper work and facilities for reducing the ore.

The mountains around this part of the county have been but very little prospected, although the evidences are strongly in favor of rich discoveries of both gold and silver.

At Darwin, but little work is being done at present, owing to the high charges of transportation of ore to the Carson & Colorado railroad station, at Keeler, which are \$6 per ton. As the reduction works at Keeler are not in operation, all ore has to be shipped over the railroad to San Francisco, making a long haul at great cost. The charges are based on the value of the ore which prevents anything under 60 ounces of silver to the ton being shipped; whereas, if the railroad run down the valley to Mojave, making a shorter haul, lower-grade ores could be shipped to a profit.

At Cerro Gordo most of the work now being done is by lease of the various mines and by chloridizers, all of whom, however, are doing exceedingly well. Those at work in the Diaz mine are taking out ore that averages 90 ounces of silver and about 65 per cent of lead to the ton.

The San Pedro and Aries mines are being worked by chloridizers who are doing equally well.

The San Lucas mine is worked by five men who are constantly shipping their ore to San Francisco.

The Union mine has now only four men at work, who extract about six tons per week on an average which yields 100 ounces of silver and 50 per cent in lead to the ton of ore.

The Ygnacio mine is under lease to George Reese. This mine has now over 10,000 tons of ore thrown over the dumps that will go 40 ounces of silver to the ton besides carrying some gold, and at least 20 per cent of lead, none of which is saved or worked on account of the Swansea works at the foot of the hill being closed down. Consequently it will not pay them to ship any ore that pays less than 45 ounces of silver per ton. This mine has produced since it was opened over \$6,000,000, and there is no doubt but that it still contains double that amount. Want of enterprise apparently of the owners, and stoppage of the smelter at the lake, has depressed all operations and caused lethargy where all should be activity, for the Cerro Gordo group of mines is doubtless among the richest in the State of California.

The Indiana mine near Owens lake is a small vein varying from 6 to 12 inches in width, but yields about 150 ounces of silver and 30 per cent of lead to the ton. Only two men are at work on it at present.

## Mining-Law Amendments.

EDITORS PRESS:—I saw by the PRESS of April 25th a copy of the amendments to the mining law. Now the miners of this (Cave Creek) district got together and we read the amendment as you have printed it, and we think the law is all right, except one clause. That is that a miner shall not locate more than one claim on the same vein. Now, while it is hard to make a law to suit all, still it is but right and just that the prospector, who is the pathfinder of all our new country, should have some priority of right. He goes into a wild country and finds a good prospect and can only locate one claim on the same lode. Some one follows him, locates up against him and waits till he does his work, and if she pans out he will try and get rid of his claim at some price on the strength of the first one's prospect. After all, it does not deprive one from owning more than one claim on the same vein. What we want is a law that will compel the miner to do a certain amount of work in a certain time. That will open more country and do more good than trying to stop miners from locating claims.

Cave Creek, Arizona.

A MINER.

## Kern County Mines.

EDITORS PRESS:—There are but few miners at work throughout the county at the present time on account of want of water in the placers, although at Kingsville some men are working who have small ditches in connection with their claims, and these are making most excellent wages all the way from \$40 up to as high as \$100 per week to the men.

At Kernville, Judge Sumner employs ten men in his claim, which we hear is paying very well.

The Big Blue Quartz is still idle, with but little prospect of reuming for some time on account of the water in the mine, which cannot be taken out until new hoisting works are erected.

ed, the old works having been burnt down some time since.

This mine formerly kept an 80-stamp mill going. The mill, which is standing idle, is in charge of Mr. Price, brother of Thos. Price of San Francisco.

At Hanlah the district is comparatively dormant, although some prospecting of quartz ledges is going on. The cause of inactivity is in some measure owing to want of milling facilities, two mills having been burnt down there. However, teams were met near by loaded with a five-stamp mill going in, which will be erected immediately.

Mr. Burbridge of San Francisco is prospecting a ledge here which gives promise of favorable results.

K.

## The Mining Law Changes.

EDITORS PRESS:—Senator Stewart's new mining law, as I understand it, limits a locator to one location on the same lode, lead or vein. Now opposing I make two discoveries, say 2000 feet apart, and both discoveries show a body of ore with well-defined walls and apparently having the same course, how am I to know whether my discoveries are on the same vein or not, and can any one tell without uncovering the ledge the entire distance between the two points of discovery? What, therefore, would prevent me from making two locations claiming that there were two veins, and who could dispute it successfully? But supposing some other fellow would locate over me on one of my claims, just making difference enough in the lines to give him room to do his assessment work on his own ground, and that I should go on and work my claim and find out that they were really on the same vein, could the other fellow come in for damages? And further, suppose I locate two claims truly,



believing at the time that they are parallel veins, but after working I find out that I have been mistaken and that the vein runs as marked with dotted lines. Should the "other fellow" find it out, could he locate over me and hold the ground on one of my locations? and if so, on which one? I presume that my first location would hold. I can't see how the new law will be any ahead of the old one in the above particular, but, on the contrary, will open the way for more litigation, I believe.

Wallace, Idaho.

W. S. H.

## New Coal-Fields.

Messrs. G. Wingate and E. P. Thompson of Clatsop county returned Friday from Washington county, whither they went last Monday for the purpose of inspecting the newly discovered coal-fields. Mr. Wingate is an expert in the business, having been superintendent of a coal mine at Coos bay and having opened a mine on Vancouver island near the Wellington mine. These gentlemen say the Washington county mines are extensive and in an unbroken country. Not enough development has been done on the croppings to show the thickness of the veins. The county has the appearance of a coal country, and it will be very easy to prospect. Should the coal prove to be of good quality in paying quantities, it will be no task at all to reach it with a railroad.

Hon. T. B. Handley has visited the coal-fields, and sends to this week's Hillsboro Independent the following letter:

From notes of a visit to the coal-beds of the Nahalem I furnish you the following items:

So far as prospected, the coal lies in Columbia county, in the territory between Pebble creek and Elk creek, in township 4 north, range 4 west. In this scope 26 claims have been located, containing each from 40 to 160 acres.

The country is very broken and rough, being a succession of deep ravines and steep ridges, mostly burned over and covered with fallen timber and tangled underbrush.

It can be reached best by way of Archbold's mill and the old State road, which is open for wagons within two miles of Pebble creek, and can easily be cleared the remainder of the way.

An easy route for a railroad can be had up a branch of the west fork of Dairy creek and through a low pass to Pebble. On this line there is very little elevation in the way of railroading.

No systematic prospecting has yet been done, and nothing more than croppings have been tested, but enough is known to justify the conclusion that an immense ledge underlies the entire tract. The croppings show in the gulches from a trace to five feet in thickness, bituminous coal of a good quality, pitching slightly to the north and east.

Some idea of the importance of this find can be had by figuring on a three-foot ledge, which will be found to contain over 3,000,000 tons to the square mile.

There can be little doubt that the ledge is over three feet thick, and that in a short time we shall see a railroad tapping the mine and thousands of miners enriching themselves and the country.—Portland Oregonian.

## The Original Pittsburg.

According to the prospectus published in the London papers, the price to be paid for the Pittsburg (Grass Valley) mine is £90,000. It is payable entirely in fully paid-up shares, or, at the company's option, partly in cash and partly in paid-up shares, the minimum of shares to be taken by the vendor being £33,333, leaving a balance of £10,000 available for working capital. The new company is called the "Original Pittsburg (Grass Valley) Gold Mines Limited." The capital is £100,000 in shares of £1 each. The subscription list closed on the 24th ult., in London. The California directors are Julius Bandmann, Fiesco Mandelbaum and Reuben H. Lloyd, all of San Francisco. The mine has been reported on by Prof. Constantius Hensch of San Francisco, and Gilbert Pitcairn Simpson of London.

The prospectus says: "This company is formed for the purpose of acquiring and extending the working of the Pittsburg gold mine in Grass Valley district, which has been for years one of the most active centers of quartz mining in California. In fact, there is perhaps no district in the world where gold-quartz mining has been prosecuted with such continued and unvarying success as in Grass Valley."

"In the immediate vicinity of the Pittsburg mine are some of the oldest and most productive gold mines of the State, including the Idaho, the Eureka and the Empire mines, whose joint production of gold has amounted to over \$10,000,000. The Idaho, which is considered to be the richest mine in California, is at a distance of less than 1000 yards from the Pittsburg, the vein of which is believed to be the same as that of the Idaho and Empire mines."

"The character, for depth and permanence of the quartz veins in this district, is conclusively established, some of the mines above-named having attained a depth of 2500 feet, and the quartz which they are now getting being better than that which came from the upper levels."

"The Pittsburg mine is easy of access by rail from San Francisco, the branch road from Colfax on the Central Pacific road to Nevada City passing through the company's property and affording great facilities for the transportation of machinery and supplies, as there is a siding at which trains can load and discharge within 350 yards of the main shaft. The South Yuba canal passes near the works and furnishes the greater portion of the motive-power for the mine and mill, and the water supplies and facilities are unusually good and abundant. The natural and artificial surroundings of the property are extremely favorable, and the climate is excellent, the altitude being about 4000 feet above the sea level."

"The amount of gold already produced by this mine has exceeded \$1,200,000. A considerable portion of this amount has been absorbed by deadwork in sinking shafts, running levels, and by improvements of every description in the way of machinery for hoisting and pumping, after payment for which about one-half of the amount of gold raised remained as profit."

"There is a 10-stamp mill on the property which it is proposed to enlarge to 20 stamps, as its present capacity is insufficient for the available output, as there is now exposed to view and ready for extraction 11,000 tons of pay quartz, worth £66,000 gross. The hoisting and pumping machinery is in perfect order. The mill and pumping machinery are driven by water, but steam power can at any time be used, the timber on the property being abundant for all fuel purposes. There are also on the property all necessary buildings, including a superintendent's house and convenient offices."

"The contract for purchase, dated 15th March, 1885, is made between Henry Jarvis Alfred of the one part, and James Nicoll, as trustee for the company, of the other part, and recites an agreement, dated 9th February, 1885, made between the Pittsburg Gold Mining Co. of the one part, and the said Henry Jarvis Alfred of the other part."

"The vendor will provide all the preliminary expenses of the formation and bringing out of the company, and the issue of its capital, and he has reserved to himself the right to enter into and has entered into arrangements with third parties for this purpose, which do not, however, affect the company, and to which it is not party. As these arrangements may, technically, be contracts within the meaning of S. c. 33 of the Companies' Act, 1867, applicants for shares shall be deemed to have notice thereof, and to have waived any fuller compliance with such section with reference thereto."

The Grass Valley Tidings notes three incorrect assertions. First, that the Pittsburg is at a distance less than 1000 yards from the Idaho vein. It is something more than that distance. Second, some of the mines around here are spoken of as having attained a depth of 2500 feet; 1800 feet is about right. Third, the joint production of the mines named is more like \$25,000,000.

PROTESTS are going up all along the line against the granting of the petition which has been sent to the Government Fish Commission to stock Oregon waters with catfish.

TWENTY of the Copper Queen Company's miners at Bisbee have been discharged for gambling.



## Copper in Alaska.

From Lieutenant Henry P. Allen's report of his explorations up the Copper river we learn the following interesting facts about the country:

Copper river is a stream of considerable size, very swift and difficult of ascent in boats. It is not confined to one channel, thus forming many large islands, and its volume of water is so great that the stream spreads over nearly the entire bottom of the valley. Along its banks are large gravel bars, and the country throughout is marked with extensive glacial deposits. After passing the glaciers, which lie about 40 miles back from the coast, the climate in summer is dry and warm, and in the winter it is mild and no great depth of snow falls. The mountain ranges are very high and are marked by many lofty peaks, the highest of which is Mt. Wrangle, which is now considered the highest mountain in North America. But a few years ago Mt. Wrangle was an active volcano, breathing out flames and molten lava, and she now sends out clouds of smoke and vapors. The mountain is situated northeast of Mt. St. Elias and about 200 miles back from the coast, and in the very heart of the mineral regions of Alaska.

In regard to the mineral resources of that section, Lieutenant Allen speaks as follows:

"The minerals of Copper river have long been a source of speculation, owing to pieces of pure copper, knives and bullets of the same metal having been brought down to the coast by the natives. Some of the specimens are supposed to be associated with silver, and in fact I have heard of some brought down which assayed in Boston \$80 per ton in silver and 60 per cent of copper. Nicolai's house, situated on the Chittystone, the south branch of the Copper, and six miles above the mouth of the Chittito river, is supposed to be in the heart of the mineral region, and by him we were shown a vein near his house which at that season of the year (April) was above the snow line. He gave us, however, some specimens which proved to be bornite, a sulphur of copper and iron. He said the pure copper was on the Chittito river, between his house and the central branch of the Chittitna, as well as on other tributaries of the same. He had bullets of pure copper in his possession. We found specimens of hornite also in the hands of the natives at Nandell's, just across the divide from the head of Copper and on the headwaters of the Tananah. The waters of the Chittito (Copper Water) are of a deep yellow color from flowing through beds of copper, and the natives informed me that the waters were poisonous and that salmon would not ascend the stream. Its length is probably not over 15 miles. At one place on the main Copper, on an island, were springs so strongly impregnated with mineral that their water could not be drunk. Even a sip left for a long time a disagreeable taste. In ascending the Copper river it was observed that the banks were a green hornblende rock, intersected by mineral-bearing quartz veins. Up further these gave way to a green basalt, which had at its northern end a fine quality of slate that split easily into laminae transversely to its bed. A few miles from the mouth of the Chittitna it cuts through bluffs of beautiful greenstone, intersected by white veins, which appeared to be limestone. The pebbles and boulders in this riverbed are much discolored by copper stains, but not to such a remarkable degree as those of its tributary, the Chittystone. The mountains around the headwaters of the latter are sandstone and felspathic granite. A feature of some of the high banks of the Upper Copper is the strata of boulders many feet below the surface."

—*Alaska Free Press.*

## Prospecting in Nevada.

The Belmont *Courier* says: This is the season when the prospectors go into the mountains in search of the precious metals. The indications of hidden wealth in the Jefferson, Belmont, Spanish Belt, San Antonio, Monitor and Toiyabe ranges are numerous and sufficiently strong in character to encourage experienced prospectors to persevere in their efforts to discover new and productive ledges carrying gold and silver. The outcrops of these ranges are being more closely examined for indications of the precious metals than ever before, and it would not be surprising to learn that veins which heretofore had been considered worthless were worthy the attention of capital, and might be made producers of hullion. Veins carrying gold and silver are not as plentiful and easily found as the Eastern enemies of the white metal would have the world generally believe. There are no hardships that prospectors will not endure in their search for the hidden treasures of the earth that, when discovered, do them very little good, for it is a well-known fact that the grub-stakers and small operators get the cream of the results of their discoveries. To the hardy prospectors is due the opening of new countries and districts to the less venturesome people of the world, and hard knocks and tough times are generally their greatest reward. The world profits by their discoveries, populous towns spring into existence as if by enchantment, and the prospectors (hewled by the motley crowd their discoveries have called forth) strike out for some undiscovered country that fable says is rich in the precious metals.

Enough prospecting has been done in this section of Nye to convince any one who knows anything of mining that there is no better nor more mineralized country anywhere. Capital properly expended would place all the mines of Philadelphia district on a paying basis, and the same may be said of the mines of Jefferson and San Antonio districts. The Barcelona mine at Spanish Belt is opening up splendidly, and shows immense quantities of fine milling ore that will be worked in the Monitor-Belmont mill this summer. John Griffin is uncovering a fine body of ore in the El Dorado North, and James Laity's mine improves as he goes down on the vein, which is now five feet thick—all good milling ore. Wherever work is properly prosecuted in the mines of this section they pay handsome returns to their operators, and prospectors find many worse ranges to hunt new discoveries in than those of Nye county.

## A Mining-Stock Boom.

Lively Speculation in Wildcats in the Colonies.

Great excitement and lively speculation in mining shares is reported from Melbourne, Sydney and Adelaide. The Sydney *Herald* says of the boom: "It does not require much prophetic instinct to say that the silver boom in Australia will be certain to end in disaster to many. Any one who has lived a quarter of a century and seen the fate of the various mining booms within that time could hardly predict any other future for the speculative mining business which has now been in operation with fluctuating activity since the beginning of the year. We have had gold, tin and copper mining booms which have brought disaster to numbers. Even the silver-mining boom at Sunny Corner two or three years ago brought loss to many, and gain to few—the loss far exceeding the gain. Therefore, in predicting that the present silver-mining boom in Australia will end in disaster, the English press has reasoned upon the experience of the past, and the conclusion arrived at is one that has already been come to by many in Australia, especially by those who have observed the operations of the Mining Exchange with its exciting whirlpool, already contracting its circles and bringing its victims nearer the vortex. The values are determined on the Stock Exchange, not in the mines; and the enhanced prices of properties which have not yet returned a dividend have made the fortunes of a good many clever and lucky speculators in Sydney, Melbourne and Adelaide. Whether present holders will repeat their experience remains to be proved.

"The mining mania which has now possession of the British and Australian public has come at a time when people have become tired of stagnation in trade and small profits. With diminishing income from investments, where it has been possible to find the means of investment, people naturally gave more attention to the alluring prospects of mining promoters. There can be little objection to the expenditure of some portion of the realized wealth in the development of mining enterprise, provided the outlay be in exploring land which gives fair indications of auriferous treasure. Otherwise, the money spent is but senseless diminution of realized wealth."

BOSTON BAR.—Two men are at present engaged in running a tunnel under the mountain at Boston Bar in search of the original channel of the Yuba river, which is supposed to have been covered up in ancient times by a great landslide at that place. The tunnel is now nearly 200 feet into the mountain, and the formation upon which the men are at work is a soft, gravelly deposit, somewhat mixed with clay and small boulders. The longed-for channel has not been found, but the projectors of the scheme are hopeful, and will continue the work until they strike a bonanza or are assured of failure. They report having discovered four places in the Yuba river channel below Bridgeport which will pay largely for working. It is to be hoped that the report is a true one. The Yuba, in early days, yielded enormous fortunes at this point, and it may be made to yield still more, although it is now well filled with debris far above the original high-water mark. It is a common practice with the Indians of Dry creek, and the vicinity of the Oregon house, to pan out small quantities of gold from the sands of Boston Bar, and if these people can make money, even in small amounts, it is reasonable to suppose that more thorough mining will yield a better result in proportion to the means employed.—*Nevada Herald.*

CON. CALIFORNIA AND VIRGINIA.—The total yield of the Con. California and Virginia mine since the date of the ore discovery in October, 1885, to May, 1888, was \$5,941,590, of which \$2,511,826 was gold and \$3,429,763 was silver. Of this total of \$1,728,000 in coin was disbursed to shareholders in 16 consecutive monthly dividends of 50 cents per share, omitting the month of November, 1887. The operating expenses of the Con. California and Virginia mine in April were about \$199,656, divided as follows: Reduction of ore, \$97,251; Suto tunnel royalty, \$13,873; transportation of ore to Carson River mill, \$13,873; handling, \$470 46; salaries and miners' wages, \$46,833 50; mine supplies, \$23,986 37; hoisting, \$33,70 40. The company carry over in hullion and cash to the May account a balance of about \$105,000, gold-coin value.

## Superstitions of Miners.

"I do not know of a more superstitious class of men in the world than miners. Their strange fancies and beliefs are at least called superstition, but by miners whose lives have often been saved by timely premonitions of impending danger, they are as sacred as a religion. I could give facts to substantiate my assertions."

The speaker was a veteran mining man who has spent the greater part of his life among the mines of California and Arizona. At the request of an *Altus* reporter, who had become interested in the subject, the miner continued, and related some tales of his own personal experiences.

"No one," he said, "treated the peculiar beliefs of the miner with more derision than myself before I became one of them. A few years' experience, however, taught me, the skeptic, to hold these so-called superstitions very sacred. Would you like to hear how my life was first saved through a feeling of danger which I fortunately heeded? Very well. You must know that in 1879, after the mines in the vicinity of Bodie had been pronounced a failure, there was a great rush for the gold and silver producing districts of Arizona. I lost no time in beginning a prospecting tour in the new, and what appeared to me then inexhaustible, territory. I was fortunate enough to soon strike a rich lead, and, with the assistance of an intelligent young man whom I had taken into partnership, began operations. We dug into the bank of a gully, said to be a wonderfully rich spot. The work progressed favorably, and in a week our excavations extended in some 15 feet from the mouth. Not knowing that our mine would be permanent, little attention was paid to putting in the proper timbers for safety. Well, I was working steadily ahead with pick and shovel one afternoon after my partner had departed to prepare supper at our cabin, when I experienced a most peculiar feeling. My whole body seemed to turn as cold as ice, and my hands trembled so violently that I could not wield the pick. After trembling for a few seconds, a voice of thunder seemed to sound in my ears: 'Run for your life; the mine is caving!' I obeyed this strange and unaccountable warning or premonition, and never ran faster in my life as I started for the mouth of our little mine. An instant after I reached the open air the roof caved in and the mine was completely filled with the falling rocks and dirt. Was this a premonition, superstition or imagination? I firmly believe that the timely warning I received was the voice of the spirit that watches over the miners and saves thousands from violent deaths. Laugh if you will, but I can account for it in no other way. In the case I have cited, an instant's delay or hesitation would have caused my life to come to a terrible end. You may be sure that after that experience I never failed to take advantage of these strange warnings; and I am firmly convinced that they have saved my life on at least half a dozen occasions.

"A peculiar circumstance of the case I have told you is that on the night previous to the caving of the mine my partner dreamed that it was going to cave in. He did not tell me of the dream for fear that I would have nothing more to do with the mine. After a little more experience he also came to believe in these warnings as firmly as I do.

"I know of a rich mine in the San Gabriel mountains, Los Angeles county, that has caused the death of every man who tried to carry ore away from it. You may call this superstition also, but there are a dozen miners besides myself who know of the millions that could be taken from this mine and yet are afraid to go near it. Some half a dozen men had been killed by caves, etc., when my partner and I arrived after a run of six months of hard luck in Arizona. We worked around a few days and took out some specimens of as beautiful gold quartz as man ever laid eyes upon. My partner desired to go to San Francisco to purchase tools and material for developing the mine. He went and took several pieces of ore for assay with him. The ore was found to be worth about \$1000 a ton. In the meantime I remained in Los Angeles awaiting my partner's return. The next I heard of him was that he had been stricken with leprosy and died a horrible death in the pesthouse. It is hardly necessary to state that I never returned to the mine. The certainty that I also would come to my death in short order prevents me from doing so."

MT. DIABLO COAL.—The Martinez *Gazette* says: We are informed that the company now engaged in working the coal leads at Somersville intend operating in the near future on a more extensive scale. Our informant says that it is probably the intention to get at the large vein of coal known to be lying in the flat below Sam Brown's store, by means of the old Independence shaft, now down a depth of 700 or more feet. This shaft was abandoned years ago on account of the vast amount of water then flowing in from the vein, and it is thought by putting up heavy pumping machinery this obstacle can be overcome, and the mine kept dry enough to enable work to be pushed ahead. This shaft will probably be driven down still further, and if such should prove to be the case, we predict lively times for Somersville, as well as a direct benefit for the entire county. Sheriff Rankin has been working the mines at

Somersville for the past six months on a small scale, cautiously carrying on the work, and if the opening up of the Independence shaft is to at last be brought about, it is through his excellent management and thorough understanding of the business which he has undertaken. We sincerely hope the rumor is true, for with the present high prices of fuel, the mines surely ought to be made to pay handsomely, and if the company decide to sink on the large vein, it will prove an industry for Contra Costa productive of a vast amount of benefit to a large number of laborers.

## The Outlook at Wood River.

"Well, sir, I never saw a better outlook since I have been on Wood river," said one of the pioneer business men to a Wood River *Times* reporter. "The Minnie Moore is a mine and promises to become a world-wonder; the Queen of the Hills and Relief promise to prove nearly as good; Lookout Mountain shows three or four promising prospects that have already shipped. On the East Fork of Wood river the Pride of Idaho has been taken hold of by a company that has the means required to test it; the North Star—across the gulch—is a mine; the Triumph group, hard by, shows a mountain of concentrating ore; and there are half a dozen other producers of shipping ore in the same direction. In the Parker-Elkhorn gulch the workings have demonstrated the existence of a strong, well-defined, highly-mineralized vein, which must carry an enormous ore body, and three groups in that vicinity are likely to change hands soon. Boulder is coming to the front this year with large shipments of high-grade ore. Galena and Sawtooth will evidently be livelier than for years. At Vienna the Vienna Co. is to resume work with a capital of \$60,000. Beyond are the Seafoam, Sheep Mountain, Alton and other districts whose outlets are Wood river.

"At Atlanta and Silver Mountain fully 300 miners will be at work this summer; Rocky Bar will at least keep up her end, with 300 to 500 men at steady work; Pine Grove will probably follow suit with a couple of hundred, and the placer mines along the Snake river will, as usual, employ about 100. Out last river way, if the Big Copper group sale goes, and work on the big irrigating ditch is pushed vigorously by the Butte company which has taken hold, there will be lively times there, and Houston may become a town and the ranchers of the valley find a home market for their products. On the Carbonate Belt and at Era, the prospects are certainly flattering, a few claims even being put 'on velvet' by means of shipments to the Nicholia smelter. At Muldoon the Black Spar Co. will doubtless show up a good mine, while the Little Wood River Mining and Smelting Co. must, it seems to me, do something with its valuable mines and slag dump.

"This brings me back to the River. First of all there is the Gold Belt. If that could be started successfully, the whole River would prosper. It would even have a genuine boom, and on merit. I understand that the experts who were here recently are coming back, the bond having been extended 30 days. That itself is good. They may not buy, but their return will speak very loudly for the merit of the property, and such a whopping big price, too! Why, you remember that everybody, almost, used to laugh at you and the *Times* for saying so much about the Gold Belt. They thought there was nothing in it. Now they begin to think differently—and so does capital. It may be a big proposition, but capital will be found to take hold before very long, no matter how much is required.

"Next in importance to the Cold Belt is Smoky, the value of whose mines no one can approximate, but that there are mines there no one can deny. Look at the Silver Star, Smoky Bullion, Carrie Leonard, King of the West, Stormy-Glory, Tyrannis, Dollarhide group, and other properties that have yielded more or less, but every one of which has paid a good profit from the grass roots, besides paying for development. To be sure the King Co. has spent about \$35,000 opening up its claim, but that has made a mine, and now all it has to do is to take out the ore and declare dividends. It could have paid as it went, but it would have taken years to open it up.

"Der creek shows more ore than ever before. Look at the Emery, War Dance, Red Cloud, and others. The Nay Aug will be a mine long before the \$30,000 of working capital provided shall be exhausted. Bullion is the only cloud in our sky—and it is a dark one, yet it has a silver lining. I understand that the Durango boys expect to be made more than whole before fall, while the Idahoan, now that the owners—or, rather, some of the owners, for they were not all willing—have failed to sell it to English parties who did not seem to want it badly, anyway, since they did not even come to see it, will doubtless soon be operated again. The Red Elephant, too, shows ore, and with muscle and some money may be made a mine."

THE Kootenai Railway Co., which has just been chartered by the British Columbian Government, receives a grant of 200,000 acres of land, to be selected by them in the Kootenai district. The road is to be started in three months and completed in two years. It will connect Lake Kootenai with steamers on the Columbia for the transportation of goods, ore, etc., to the Canadian Pacific at Revelstoke.



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W. B. EWER.

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SAN FRANCISCO

Saturday Morning, May 26, 1888.

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## Passing Events.

Active steps are being taken to properly develop the tin ore deposits in San Bernardino county, this State. These deposits have long been known, but for various reasons no active operations have heretofore been carried on.

In several places in this State, electric power is to be utilized in driving mining machinery. A company to furnish this power has been organized in Grass Valley. In San Francisco and other large cities, the use of the power is gradually increasing. Under certain circumstances it is a great improvement over direct steam power.

The local foundries and machine-shops are now quite busy with spring orders. More or less mining machinery is made here at all seasons, but at this time of the year the orders in this direction usually increase.

**THE LICK OBSERVATORY.**—We expect to give in the next number of the PRESS a complete description of the Lick Observatory with engravings of the buildings, instruments, etc. The observatory will very shortly be delivered to the University by the Lick Trustees. Our description will embrace many details of interest to scientists and the public generally.

At the last meeting of the Academy of Sciences, a paper by Gustav Eisen on "Antiquities of Guatemala" was read. Illustrations with stereopticon views accompanied the paper.

## Our Tin Mines.

The California Mines to be Opened.

The Eastern mining papers are from time to time filled with statements of the wonderful discoveries of tin ore in the Black Hills and in proximity to Rapid City, in Dakota. We hope that the results may justify the statements, for the United States is dependant entirely for the vast quantity of tin consumed here upon the foreign supply. This cost is supplied with tin almost entirely from Australia, while the balance of the United States is almost entirely supplied with tin and the whole country with tin plate or sheets from England. We do not know the value of the latter, but in 1887 the value of tin here alone imported into this country was \$6,927,696. That the value of sheet or plate tin was largely in excess of this sum cannot be doubted, and we believe that the total value of this metal and the articles manufactured from it imported will exceed \$15,000,000. It is, therefore, a matter of much importance to this country if we can, out of our own mines, meet the requirements of this demand which is constantly increasing.

Most of our readers, and in fact a very large majority of our people, are not aware that in the State of California is a deposit of tin ore unequalled in the world. Nature has been, as we all know, most prodigal in her gifts of the royal metal (although our courts have closed the largest source of supply of that metal, by closing the most extensive permanent and productive mines in the world), and she has also supplied us most bountifully with almost every useful metal; but until quite recently it was not generally known that she had also supplied us with tin ore to an unlimited extent.

From time to time vague rumors during the past 20 years have been published as to the finding of tin in San Bernardino county on what has been known, and is still known, as the Rancho Sobrante de San Jacinto, belonging to the San Jacinto Tin Co., a corporation organized in this city in 1868, and still in existence here. A part of the City of Riverside, as also of Arlington, is situated upon a portion of this ranch, which was patented in 1868 to an extent of about 50,000 acres of land. Upon the western portion of this grant is a range of mountains called the Temescal, and in this range, in proximity to the western limit, is what is called the "Tin belt." It is about seven miles long by two miles in width, and within this district there has been located some 200 mining claims upon as many different ledges.

When the San Jacinto Tin Co. purchased the Mexican grant of 11 leagues in 1868, it took two days, with a pair of horses and wagon to drive from San Pedro, the nearest steamer landing, to the ranch, a distance of about 100 miles. But the tin company went to work upon one location known as the Cajalco mine, which had been prospected a little by early locators, the prominent croppings assayed only one per cent. Shafts were sunk upon this vein which increased in richness in depth, until a depth of 150 or 200 feet was reached. An adit was run on the first level, and some cross-cuts were made which developed a powerful and rich vein. At the bottom of the main shaft a tunnel or drift was run on the vein for some 400 feet, developing an abundance of ore of high grade. Quite a quantity of ore was sent to this city, and over a ton of tin bars of exceeding purity was smelted from it. Tin plate was also made here, and the whole product was exhibited at the Mechanics' Fair in this city, obtaining the gold medal. As there was no fuel near the mines, and no water except in the mine, and as it cost largely for supplies and transportation of the ores, the company closed the mine, concluding to wait until cheaper transportation, labor and material could be had. The construction of the Southern Pacific railroad again brought the working of the mine into prominence, as at Colton it was only about 20 miles from the mine, and the company had serious thoughts of again opening the works, when, through the representation of a person claiming some mining locations there, the Attorney-General of the U. S. Government was persuaded to allow its name to be used in a suit to set aside the patent. This proceeding of course suspended all further work at the mine until that suit was finally decided in the U. S. Supreme Court in Washington some three or four weeks since.

During the long years of delay in contesting

this and other suits, railroads had been constructed along two sides of the ranch, one of which is within some four or five miles only of the Cajalco mine, and another one is now being constructed which runs within a short distance of it. A coal mine has also been opened a few miles from it. Water by means of artesian wells has also been found in abundance in Temescal valley, close to the mine. Irrigation has been promoted and population has poured into the section adjacent to the ranch line. Reservoirs have been located, and in fact the whole face of the country has been changed. The finest citrus fruits raised in the State come from there, and supplies of all kinds are cheap and abundant.

Pending the decision of the U. S. Supreme Court, negotiations were opened with parties in the East and in England for sale of the property, depending upon decision of the Supreme Court and an examination of the property. An expert has been sent out from Cornwall. The mine has been cleared of water and the accumulation of 20 years of idleness. Examinations now being made have more than confirmed the statements of the company as to its extent and richness. Many other locations have also recently been made and prospected with the unvarying result of ascertaining that they carry in the croppings from 1 to 15 per cent of tin.

The Cajalco mine carries ore in large bodies, one vein of solid ore at its widest being about eight feet. It is exceptionally rich in tin, carrying it in some places as high as 50 per cent. The metal is of exceptional purity, and 10 locations of these veins within 1000 feet of the Cajalco have been recently prospected. It is believed that there is tin enough in that tin belt of 14 square miles to supply this coast with great ease, as well as the United States. Such ore as is being extracted now to send to England is very rarely or never found in any similar mine in the world. Much of it carries tin up to 50 per cent, and as the tin concentrates can only be carried up to 78 per cent of pure tin even in Cornwall, it can readily be seen how rich these ores are.

If the parties proposing to purchase the property do so—as there is every probability of doing, and as they are gentlemen of large wealth, familiar with tin mining and manufacture, and largely interested in it in England—they intend to erect large works near the mine, not only for making tin bars, but to manufacture tin plates to supply this coast west of the Rocky mountains, which within itself will be quite enough for one concern to attend to, and we expect to see within a limited space of time the tin mining and manufacturing industry among the prominent industries of our State. One thing connected with this mining industry is strongly in its favor. The mines are so situated that our United States Circuit Court judge cannot by any possible construction of his debris views close them, because there is no possibility or probability of the tailings or debris from them getting into the Yuba, American, Feather or Sacramento rivers, and if by any possibility some of them should get into the Santa Ana river, it is not probable that our anti-mining judge will extend his legal arm so far as to close the mines for fear some of the tailings might get into the Pacific ocean and find a final resting-place on the bottom of it.

THE Trustees of the Mt. Diablo Mining Company have declared a dividend of 20c per share, payable May 24th. This mine is capitalized into 50,000 shares of \$100 each. There have been three assessments, the last one being \$2 per share, levied in June, 1880, and the three amounting to \$137,500. There have been seven dividends paid, the last one having been disbursed in July, 1885. These amounted to \$80,000. For nearly three years the mine has been unproductive, yet has been managed with little expense to stockholders. The dividend just declared amounts to \$10,000. But for the low price of silver there would be a much larger surplus from month to month for the dividend account.

It is stated that a company is about to start electric works on Deer creek, below Nevada City, to be run by water-power. It will be sent to those mines in Grass Valley and around Nevada City that are not in reach of water-power. This electric power, generated by water-wheels and dynamos, is next in cheapness to water-power itself. Several mining companies agree to take the electricity.

## Swindling Patent Concerns.

The police of San Francisco have shown up the Globe Patent Company of this city as a swindling concern, which has been taking the money of inventors on false pretenses. Letters have been received from many persons, mainly from the East, making complaints about the company. An investigation showed that none of the firms and banks whose names were used for reference had been consulted, and the names of even some of the officers were used without their consent. The company had advertised itself by circulars as "the largest and most reliable patent-selling company in America, with unlimited resources, the best local and traveling salesmen and corresponding agencies in Chicago, Washington, New York, London, Liverpool, Glasgow, Berlin and Hongkong." They had written to inventors, and by specious pleas had induced them to forward money. The usual thing, after agreeing to sell a patent, was to ask for \$15 or \$18 "to make a search in the Patent Office." Of course, the search was not made, and the inventor heard nothing more of the matter. If he inquired he was told a tale had not yet been made.

This is not the first time that concerns of a similar nature have been started in this city. Chief Crowley says that the chief difficulty in obtaining evidence against the men who run this and similar concerns, is that they send all their circulars East, and the victims cannot be found as the sums realized from them are so small that they do not care to make any complaint. Still, people on this coast are taken in also, and, moreover, there are other establishments in Eastern cities, which reach out for Pacific Coast inventors.

As soon as an inventor receives his patent, and the fact is published in the Patent Office Gazette, the patentee is flooded with a lot of circulars sent by mail. These are from patent agents who want to get future business, and from patent agencies that want to sell the patent rights, or rather make the inventor believe they want to.

Of course, some of these patent-selling agencies are bona fide concerns doing a legitimate business. But among them are others of a similar character to the one just exposed in this city. They first want some kind of a fee for advertising, printing circulars, etc., and nothing more comes of it.

In such cases the amount is comparatively so small that a man prefers to bear his loss rather than to go to any further trouble. In this way these unscrupulous agents reap quite a harvest. All they need is a desk, letter-heads and postage stamps to start in business. Some of them ask for models, and others only for drawings, but some sort of fee is required before negotiations go very far.

It is just as well for inventors to inquire into the standing of the firms who send circulars to them before paying out any money. It may be noted in this connection that few patent solicitors of standing or respectability combine a patent-selling agency with their business. Negotiating the sale of patents is a separate business entirely from that of obtaining patents for inventors. There are frauds in both lines of business, and people who are about to obtain patents should be sure that the firms they deal with are of respectable character and reputation.

It is stated that the Livermore Coal Company, the mines of which were recently described in the PRESS, is about to begin operations on an extensive scale. It has purchased coal-bunkers, railroad tracks and cars, and will receive an engine and boiler shortly. One incline is down 130 feet, and they have struck a vein of coal four and a half feet thick, which is excelled by no other on this coast except Wellington. The company proposes in three months to be able to ship 100 tons of coal a day.

THE Senate Committee on Mining has decided to report favorably, with some modifications, the bill submitting to the Court of Claims for adjudication the title of Wm. McGarrahan to the mineral interests of the Rancho Panoche Grande in California. The minority report will also be made.

MR. J. C. FLOOD, one of the "bonanza firm," has resigned as director of the Nevada bank and has left for Europe in order to try and recover his health.



## Buck-Scrapers for Earthwork.

In the engineering features of the construction of ditches, canals, levees, etc., in mining and irrigation enterprises in California, the question of the best method of moving masses of earth is a very important one. In a paper read before the Technical Society of the Pacific Coast by George J. Specht, he presented some very interesting notes on earthwork, relating specially to the enterprise of the Sutter County Land Co., which owns several thousand acres of land in Sutter county, about 16 miles south of Marysville, 8 miles east of the Sacramento river and 6 miles west of the Feather river. This land occupies nearly the center of the Sutter basin, which plays a very important part in the drainage of the northern part of the State, serving during periods of flood as a relief basin to the Sacramento and Feather rivers, whose waters, owing to insufficient capacity of the river channels, are backed up from the lower end of the basin.

These levees are not exposed to the constant wash of a river current, their only service is to protect the land against the water flowing into the Sutter basin at periods of flood, when the basin forms a large inland lake. The levees built in this section of the country are constructed usually with an outside slope of 3:1 or 4:1, and an inner slope of 1.5:1 or 2:1, and a top width of from 6 to 10 feet. The earth which is used to form the embankment is taken from both sides of the levee, and is put in place by means of scrapers.

The Sutter County Land Company's levee, as built at present, is 6' wide on top, with slopes of 3:1 on the inside, and 4:1 on the outside; its height varies from 6 feet to 14.5'. This type will probably be changed gradually to a 10' wide crest, with slopes 6:1 outside, and 2:1 inside.

In the construction of the levee just referred to, buck-scrapers and a few dump-scrapers were used. The buck-scrapers were 8 feet long and 23 inches wide, from outside to outside. The other dimensions can be seen in Sketch No. 1. Four horses are required to move one scraper. The driver stands on the end of the tail-board, pressing by his weight the edge of the scraper upon, and into the ground. This weight was not properly applied in the scrapers used, and two additional men were required to weight them down during the time of filling. The horses pulling ahead, earth accumulates in front of the scraper, and it is moved and deposited where required. To dump the earth, the driver steps off the tail-board, and the forward pull of the horses turns the scraper on its lower edge and empties it. The scraper then runs on its side-boards over the deposited earth to the other side of the levee and into the borrow pit. The side-boards are protected by flat iron  $\frac{1}{2}$  inch thick. In the pit the driver takes hold of the tail-board, presses it down upon the ground and steps upon it, and again proceeds as above described.

A certain number of scrapers, varying according to the requirements, were worked in one gang, continuously moving from one side of the levee to the other, an operation by which the earth is well packed. The first load is taken near the foot of the slope, and the circuit enlarged with each trip until that particular section of the pit is scraped clean. In order that the work may proceed without interruption, it is absolutely necessary to have sufficient ground plowed ahead of the scraper gangs.

The capacity of one buck-scraper during the construction of the Sutter County Land Company's levee was as follows: Seventy thousand cubic yards were removed in 1277 scraper days, or one scraper moved per day about 55 cubic yards; 294,000 cubic yards were moved in 3249 scraper days, or one scraper moved per day 90.5 cubic yards.

The small capacity in the first case was due to the inexperience of the contractor, as well as of the teamsters, and to the fact that it was an old levee, partly finished the year before, which necessitated a higher pull. The total work done was 364,000 cubic yards, moved in 4526 days, or one scraper moved per day 80.5 cubic yards on an average. The cost varied from 9.63 to 11.4 cents per cubic yard.

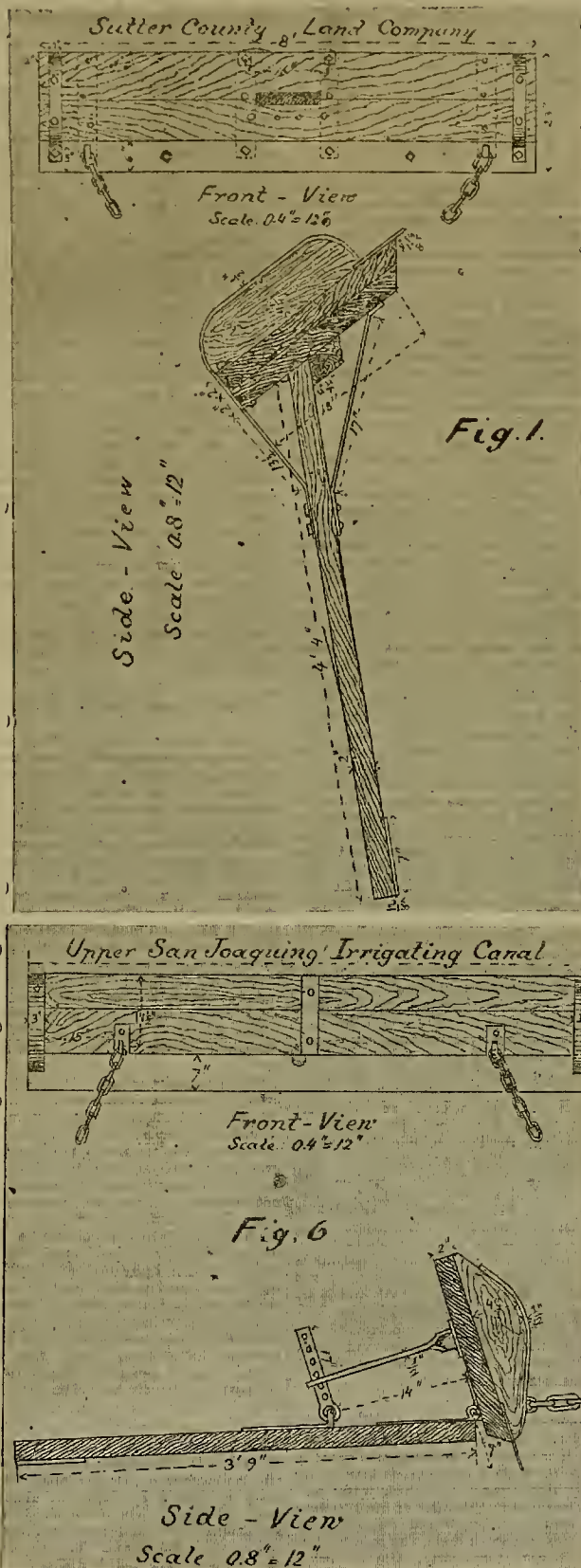
Mr. Specht in his paper gives a number of sketches showing sections of the levee. As, however, we only desire in this article to give some details of the work of the scrapers, we omit the sketches of the levees and canals and

only give Figs. 1 and 6, showing the appliances referred to.

He gives in his paper a sketch of the scraper used at the Upper San Joaquin irrigating canal in Fresno county several years ago. The canal runs for several miles along a high bluff, which is apparently the shore of the old river channel. This bluff, which is composed of sediment, sand and hardpan, 2:1 to 1.5:1 for about 75 per cent of its length. There is no rock, and this hardpan occurs in strata of from a few inches to one foot in thickness, separated by quicksand. The

1.3 cubic yards. All the conditions were very favorable. This is the average of 1000 observations. The maximum load observed was 1.64 cubic yards. Later observations of the same pieces of work showed an average daily capacity of one scraper of 128 cubic yards. The daily expenses of each buck-scraper was \$4.65. The average capacity of one scraper per day was 131 cubic yards.

The California Chemical Works, owned by John Reynolds of this city, and the California



BUCK-SCRAPERS FOR EXCAVATING, ETC.

hardpan is sufficiently solid to stand with a slope of 0.5:1, while the underlying sand rests only at 2:1 or 3:1. The work of excavation and building lateral embankments was done by buck-scrapers and dump-scrapers. The dimensions of the buck-scraper are shown in Fig. 6.

As all the loads had to be moved down hill, the work performed daily by one scraper was large. Observations showed that, with a total length of the round trip of 400' and a vertical distance of 40', in 9 actual working hours one scraper made 95 round trips, carrying at each

Chemical Co., of which Wm. T. Coleman & Co. were proprietors, are separate and distinct institutions. Mr. Reynolds has been in business for some 22 years and still continues.

THE U. S. sub-Treasury at San Francisco now contains \$30,000,000 in gold, \$25,000,000 in silver and \$1,000,000 in notes and currency.

THE machinery of the Berriman Con. or Dromedary mine at Grasa Valley is to be run by electricity.

## Foundry Notes.

The steam schooner Point Loma, the machinery of which was built by the Fulton Iron Works of this city, recently made a trip from Navarro river, Mendocino county, to San Diego in 48 hours, carrying 14,250 railroad ties. This vessel has triple-compound engines. There are two high-pressure cylinders 10 inches in diameter, intermediates 22 $\frac{1}{2}$  inches, and low-pressure cylinder 36-inch diameter. The stroke is 24 inches. The boiler for this engine is 10 feet 9 inches in diameter and 10 feet long; the shell is made of one-inch steel.

The new steam schooner Del Norte, which had a trial trip last week, has compound engines with 14 and 28-inch cylinders. Her boiler is 10 feet diameter by 9 feet 6 inches long, with two corrugated furnaces.

The trial trip of the Silver Spring was made on Wednesday, and was very satisfactory. She was built by George Boole for J. S. Higgins, C. A. Hooper and others. She is 125 feet on the keel, and 135 feet in length over all. She is 31 feet on the beam and has a depth of hold of 9 $\frac{1}{2}$  feet. Her net tonnage is 194 tons and she has a carrying capacity of 290,000 feet of lumber. Her machinery was put in by the Fulton Iron Works. She has compound engines, with 12x24 cylinders with a 20-inch stroke. Her wheel is 7 feet 9 inches in diameter. The steamer was built for the coasting trade, and she will make her first trip to Salmon, where she will load with railroad ties for San Diego.

Another steam schooner, to be called the National City will have her trial trip in a few days. The machinery is a duplicate of that in the Point Loma, the dimensions of which are given above.

The Risdon Iron Works have commenced extensive repairs on the U. S. Revenue steamer Corwin.

The Pacific Iron Works are introducing on this coast the Gates ore-crusher, described and illustrated in the PRESS of April 21st.

The San Francisco Tool Company are rapidly enlarging their plant for furnishing electric-power. This enterprise was started on a small scale, but has proved so satisfactory that there is great demand for the power. The company is now building, in addition to its other engines, a 250-horse power to be used for running dynamos. The Keith dynamos and motors are used.

The Hendy Machine Works are building a complete 20-stamp gold-concentrating mill for the Boaz gold mine, 60 miles from Phoenix, Arizona. This mine is owned by parties in Fort Worth, Texas.

They have arranged for putting in the Dodge rope-transmission system, displacing belts in F. A. Hihn's saw-mill at Santa Cruz.

Have just finished putting in the power of the new works of the California Door Company at 16th street, Oakland. The Hendy Works are likely to receive orders for the power for an electric-light plant at Seattle, W. T. They are also shipping a number of Triumph concentrators to Nicola, B. C.

LOWER CALIFORNIA MINES.—This is the way the Oceanside Journal comes down on the last gold excitement story emanating from San Diego: "It is surprising how easy it is for some of the San Diego papers to lie under a false impression. An old mining claim whose existence has been known here for years, and always known to contain some good ore, has been discovered, and the pretext for whole columns of scare heads and elaborate articles by the papers referred to. The statements like the following: 'The people are hurrying about half-crazy with excitement' are all hosh, and any one who comes here expecting to find either chunks of gold or great excitement, or any excitement at all, will be sadly disappointed."

IN the description of Mr. Attwood's micro-meters for measuring quartz screens, published in the PRESS recently, it was stated that in a No. 8 slot screen the diameter of the slot is two-hundredths of an inch. It should read one-hundredth of an inch.

THE Carson Mint is overrun with work nowadays, plenty of bullion coming into the refinery all the time. One hundred thousand ounces were melted last week.

THE Silver King Mining Co. of Arizona will hereafter use crude petroleum, freighted from Los Angeles, for fuel to run its engines.



## MECHANICAL PROGRESS.

## Health and Efficiency in Work.

Nearly all manufacturers recognize the fact that in order to get economical results from the use of steam-power something more than the mere selection of good and efficient engines and boilers is necessary. They know that after the purchase of such machinery comes the necessity of securing such conditions as will allow of the best attainable efficiency in its use.

There are not many manufacturers who would invest in first-class and expensive machinery of that kind and then give it such conditions as would effectually prevent economical results being obtained; the intelligence and discrimination necessary to such selection being usually accompanied by the intelligence and discrimination necessary to perceive the importance of proper conditions for its economical employment.

The manufacturer who should provide for the furnace of his steam plant, fuel of a quality utterly unsuited to it, admit under its grates carbonic acid gas instead of air, supply the boilers with impure water to corrode and ruin them, or who should voluntarily allow his engine to run in a dust-laden atmosphere, with its journals supplied with stuff calculated to destroy them instead of lubricate them, would be considered very short-sighted and foolish, and there are few men managing shops who are not possessed of sufficient intelligence to avoid such a combination of conditions, or, in fact, any one of them.

But there are many shop-owners and managers who fully recognize this, and yet entirely fail to recognize a fact which should be equally plain—that is, that workmen, in order to attain the best possible efficiency, must be given the conditions necessary to secure that efficiency, and since that part of these conditions which relate to the health of the workman are imposed by nature, it is folly to disregard or attempt to evade them.

Mechanics and workmen are, in a certain sense, engines, whose energies are directed toward a certain end, for the accomplishment of which it is not only necessary that they should of themselves be fitted and competent for the work they are to do, but that they should be surrounded with all the conditions necessary to the best possible employment of their skill and energy.

It is not enough that they should be supplied with first-class tools and appliances, but also that there should be an abundance of fresh, pure air and light. Not only is light necessary in order that men may be enabled to see to do the work which they have to do, but it is necessary for health. Nature having designed mankind to live in the light of the sun, and to breathe pure air as supplied by her, it is important to proprietors, as well as to workmen, that use should be made of them as nature intends, and a failure to do so will inevitably result in more or less injury to health, and consequent decrease in efficiency.

The most efficient man, other things being equal, in either mental or physical labor, is the man who has the best health, whose lung power is greatest, and who secures for his lungs the proper amount of nature's lung fuel, oxygen.

We believe that the vast importance, from an economic as well as from a moral point of view, of securing for shopmen the proper sanitary conditions is very imperfectly recognized by many, if not a majority of shop-owners, and that a study of this question would result in decided benefits, both to employers and employees, in very many cases.—*American Mechanic*.

**INTERESTING EXPERIMENTS.**—Chief Engineer Ogden of the Philadelphia Water-Works recently instituted a series of experiments to determine the relative value of two different kinds of coal which he was using at those works. In raising 1,000,000 gallons of water 200 feet high, one ton of anthracite pea coal pumped 455,414 gallons, while one ton of bituminous coal raised 547,142 gallons to the same elevation. The bituminous coal raised 21 per cent more water than the anthracite. Cost of the anthracite, \$2.85; cost of bituminous, \$3.10. Another experiment consisted in pumping 1,000,000 gallons 114 feet high. One ton of anthracite pea coal pumped 872,636, while one ton of bituminous raised to the same height 887,420—in this case a difference of only two per cent. Cost of anthracite, \$2.95; cost of bituminous, \$3.14. The first experiment was made at the Belmont station, the second experiment at the Kensington station. The bituminous coal received at Belmont was from the George's creek collieries of the Maryland Union Coal Co. The bituminous coal used at Kensington was Columbia bituminous, such as is furnished to the city ice-hoists. The firing in each case was similar, and the evaporative qualities of the boilers the same. Worthington engines were used at both stations.

**A GIANTIC FORGING PRESS.**—The Atlas Steel and Iron Works, Sheffield, Eng., some time since constructed for its own use a gigantic hydraulic forging press, which is believed to be the most powerful and efficient tool at present in existence. It nominally exerts a total force of 4000 tons, but its actual full power is considerably greater. Three large furnaces, each capable of heating an ingot of 100 tons, prepare the work for the massive machine, and two traveling cranes, each capable of lifting 150 tons with ease, convey the forgings from the furnace to the press and manipulate them as required. One man, who stands at the floor-level in a cage suspended from the crane and traveling with it, has under his hand four valves, by which he lifts, lowers, advances, retires, moves sideways or revolves the forging on its own axis. A second man works the lever which governs the strokes of the press, and by observing an index in front of him regulates with the utmost nicety the distance from the anvil at which the top tool is to cease its advance. A forge-master and several furnace-men are also required to superintend and to feed the apparatus, but its working is entirely under the control of the two men referred to. Mr. Krupp of the great Prussian works at Essen made a special trip to the Atlas works to see the machine, and was so well pleased with its work that he immediately ordered one for his own works.

## Ammonia Engines.

An exceedingly interesting application of ammonia to motive-power purposes is at present being made by the Campbell Engine Company, 35 Wall street, New York, several plants now in operation showing highly economical results. One of these supplies power to the *Iron Age*, a 200-horse power Wright engine being worked by the ammonia gas during the day, when demands for power are made from various parts of the building, while during the night, with a lowered consumption, the requirements are met by a 40-horse power engine, built by the New York Safety Steam-Power Company, also supplied with ammonia instead of steam.

In general features the plant resembles an ordinary steam plant using a surface condenser. Its essential point of difference lies in the means employed to reduce the exhaust vapor of the engine to a liquid state. Expressed in a few words, this is accomplished by introducing into the exhaust vapor as it leaves the engine a jet of liquor taken from the boiler (after it has been cooled), and by cooling the vapor in a surface condenser which provides also for mixing such vapor as remains with the liquor already formed. The jet in the exhaust pipe is about one-eighth inch in diameter. The exhaust vapor after leaving the spray jet passes to a set of absorbers, which are practically surface condensers. In these the vapor is converted to a liquid state, and the resulting liquor overflows into a well, from which it is returned to the boiler by means of a feed pump. The absorbers are kept cool by means of a current of circulating water. The boilers, of which there are two, are of the regular horizontal return-tube type, and as one of them suffices for ordinary working, an excellent opportunity is offered for testing the relative economies of the steam and ammonia systems; one of the boilers being worked with water and the other with the ammonia. With the exception of a few simple attachments the plant presents no complications other than those found in a regular steam plant, and no special training of the attending engineer is needed to handle the machinery properly. The special fittings called for by the Campbell Engine Company's system can be applied to existing types of steam engines without much trouble, the only precaution necessary being the removal of brass where exposed to the ammonia gas. A series of tests which were conducted within the past year have yielded results of no little interest. They were carried out with a plant at 651 West Forty-sixth street, New York, the engine in this case being of the Porter-Allen type, rated at 60-horse power. The duty shown by this engine, according to the reports before us, was from 2.43 to 2.83 pounds of coal per horse-power per hour with ammonia, against 5.62 pounds of coal when running with water. Two other tests showed for the ammonia system a coal consumption per horse-power per hour of 2.52 and 2.61 pounds. The saving, as compared with steam, is more than one-half, and is accordingly entitled to serious consideration.

The odor of ammonia may be perceived to a slight extent about the plant, not sufficiently to be objectionable. The strength of the liquor is 17 degrees Beaume.—*Iron Age*.

**FIRE-PROOF MATERIAL.**—Fire-proof building material is coming in quite general use in the larger and finer class of buildings in our larger cities. Fire ruins show that porous terra-cotta bricks and blocks best resist fire, water and frost; next to these in the order of fire-resisting qualities come concrete and burned clay work. In the best work done, the iron work is incased in porous terra-cotta, tile or brick work in roof, floor, and tile construction. The hollow tiles are faced with vitreous tile, slate or any good weather-proof coating, or with a single thickness of brick. Iron and steel framework incased in fire-proof materials give the best possible results. There is a growing preference for light porous walls of hollow material protecting an iron or wooden framework. Massive and heavy walls of brick or stone will do for architecture, but they are not as much of a mechanical necessity as they were regarded a few years ago.

**INCREASE IN RAILROAD SPEED.**—It is stated that railway trains in England are now driven at an average speed which is 14 per cent higher than it was 20 years ago, with scarcely more than half the quantity of coal.

## SCIENTIFIC PROGRESS.

## With Your Head Northward.

Scientific Reasons for Sleeping at Right Angles to the Equator.

A doctor says: "There is no doubt in my mind but the belief that human beings should sleep with their bodies lying north and south has its foundation in true scientific facts. Each human system has two magnetic poles—one positive and one negative. Now, it is true that some persons have the positive pole in the head and the negative pole in the feet, and vice versa. In order that the person sleeping should be in perfect harmony with the magnetic phenomena of the earth, the head, if it possesses the positive pole, should lie to the south, or if the feet possess the positive pole the head should lie to the north. The positive pole should always lie opposite to the magnetic center of the continent, and thus maintain a magnetic equilibrium. The positive pole of a person draws one way, but the magnetic pole of the earth draws the other way and forces the blood toward the feet, affects the iron in the system, tones up the nerves and makes sleep refreshing and invigorating. But if the person sleeps the wrong way and fails to become magnetically *en rapport* with the earth, he will then probably be too magnetic, and he will have a fever resulting from the magnetic forces working too fast, or he will not be magnetic enough, and the great strain will cause a feeling of lassitude, sleep will not be refreshing, and in the morning he will have no more energy than there is in a cake of soap. Some persons may scoff at these ideas, but the greatest scientific men of the world have studied the subject. Only recently the French Academy of Science made experiments upon the body of a guillotined man, which go to prove that the human system is in itself an electric battery, one electrode being represented by the head, the other by the feet. The body was taken immediately after death and placed on a pivot, to move as it might. After some vacillation the head portion turned toward the north, the body then remaining stationary. One of the professors turned it half-way around, but it soon regained its original position, and the same result was repeatedly obtained, until organic movement finally ceased."

## The Present Status of Mineralogy.

In the study of any branch of science it is well to pause occasionally, that we may look about us, see where we are, what we are doing, and what we had better do. For that which distinguishes science from empirical knowledge is its unity of purpose, its coherence and its definite relation of part to part, and these features develop best when attention is temporarily withdrawn from the details of special research. As a science grows and increases in complexity, the individual worker must confine himself more and more to particular investigations; these, to him, assume undue importance, and their higher significance as part of a broad general field is ignored or lost. The petty details are essential, but, in co-ordinated, they make not science, but Chaos. The scattered bricks are good material, but they must be brought together into one symmetrical structure.

These remarks are particularly true of a concrete science like mineralogy. Here we have a branch of knowledge which rests upon the observation of material facts, and which hitherto has owed little to abstract reasoning. It has grown up partly as a "natural" science, partly as an outlying division of chemistry, and hypothesis has had little to do with its upbuilding. The mineralogist collects, observes, describes and classifies species as he finds them, determines their mode of occurrence, chemical composition and physical properties, and then too often considers his work finished, except as regards the gathering of more data of like kind, with possible refinements of method. The relations and bearing of mineralogy toward other sciences have been, with rare exceptions, slighted, and a general theory of its nature and purpose has hardly been considered at all.—*Popular Science Monthly*.

**EMISSION OF LIGHT BY SOLID INCANDESCENT BODIES.**—It is generally admitted, according to the researches of Draper, that when a solid body is heated it begins at about 525° C. to emit red rays, to which are successively added radiations more and more refrangible as the temperature increases. The investigations of M. Weber have led to different results. By observing, in an absolutely dark room, either an incandescent lamp, excited by a current of gradually increasing intensity, or plates of different metals, heated by a properly adjusted Bunsen burner, he found that the emission of light begins at a temperature much below that which we have mentioned, with the production of very pale gray rays, whose refrangibility is equal to that of the yellow and greenish-yellow rays of the central spectrum. As the temperature rises the light emitted grows yellow and gives in the spectroscopic a wide gray band, whose center is tinged with grayish yellow. At low red, a narrow red line appears at one side of this band, and almost at the same time a green band, large and of slight intensity, appears at the other side. The temperature still rising, the spectrum spreads both toward the

red and green ends, and M. Weber further ascertained, by means of a thermometric element soldered to the plates, that the first traces of gray light are emitted at a temperature varying with the nature of the plate, about 396° C. for platinum and 377° for iron.—*Revue Scientifique*.

## Amalgam and Its Uses.

Amalgam is a compound of two or more metals of which one is always mercury, and this circumstance distinguishes an amalgam from an alloy. Nature presents us with only one amalgam, which is silver, and is termed by mineralogists "native amalgam." It occurs in Hungary, Sweden, etc., and is met with either semi fluid, massive, or crystallized in rhombic dodecahedrons. Klaproth found it to consist of 64 parts of silver out of 100 parts. Most metals may be amalgamated with mercury, and the combination appears to depend on chemical affinity.

When the cohesion of metal is slight, as in the cases of potassium and sodium, or when its affinity for mercury is considerable, as in the instances of gold and silver, amalgamation takes place readily by mere contact. When on the other hand the cohesion of a metal is strong, or its affinity for mercury weak, heat or intermediate action or both are requisite to effect amalgamation.

If 44 parts of mercury be mixed with one part of potassium, combination occurs with the evolution of much heat, and when the resulting amalgam is cold, it is hard and has the appearance of silver. When the quantity of mercury exceeds one hundredth parts to one of potassium, the compound is liquid and an amalgamation containing only 15 per cent of potassium is susceptible of crystallization. The density of an amalgam exceeds that of the mean of the metals; this, and the tendency of one or both metals to oxidize, are additional indications of chemical combination.

There are some metals, it has been observed, requiring heat to amalgamate them. Antimony offers an example of this; to effect combination it must be melted, and while liquid mixed with hot mercury. Mere heat, however, causes scarcely any action between iron and mercury; they may be amalgamated by mixing the filings of the metal with powdered alum and rubbing them together with a little water. After trituration, the alum may be washed out. By the intervention of tin or zinc, iron may be combined with mercury and a double amalgam is formed. Patina also unites with mercury, by the intervention of the amalgam of potassium, but not by direct action. The double amalgam of iron and zinc does not rapidly undergo any change, and is not attracted by the magnet. All amalgams are decomposed by red heat, the mercury being distilled and the more fixed metal remaining. The process of amalgamation and decomposition is employed to separate gold and silver from their ores. The mercury obtained by decomposing the amalgams is distilled and repeatedly used for the same purpose with comparatively little loss.—*Chicago Journal of Commerce*.

**INTERNATIONAL GEOLOGICAL CONGRESS.**—The fourth session of this congress will be held in London from September 17th to 25th inclusive. Previous meetings were held in Paris in 1878, Bologna in 1881, and Berlin in 1885, at each of which a large number of geologists from all parts of the world were present. In Paris 21 countries were represented, in Bologna 17, and in Berlin 18. A circular has just been issued by the Organizing Committee of the London meeting, giving particulars of the congress, and stating the general arrangements. A large and influential committee has been formed, including the chancellors of the chief universities, the presidents of the more important scientific societies, and of those societies especially devoting themselves to geology, mining, etc., the Lord Mayor of London, and many of the chief Government scientific officials. The honorary president of the congress is Prof. Huxley; the president, Prof. Prestwich. Mr. T. W. Hulke and Mr. W. Topley are the general secretaries. To the last-named all communications respecting the congress should be addressed at 28 Jermyn street, London, S. W.

**THE FLIGHT OF BIRDS.**—"The Measurement of the Forces Brought into Play by the Flight of a Bird" was the title of a very interesting paper recently presented to the *Académie des Sciences* in Paris, by M. Marey. Anatomy shows that nearly all the muscles acting on the wing serve to lower it, while the data drawn from photo chronography show that during this lowering of the wing the mass of the bird is upheld against gravity and propelled forward against the resistance of the air, the result being flight. The author here studies these two elements of the motor power separately, whence may ultimately be deduced the sum total of the motor power.

**HOW MEN DIE.**—If we know all the methods of approach adopted by an enemy, we are the better enabled to ward off the danger and postpone the moment when surrender becomes inevitable. In many instances the inherent strength of the body suffices to enable it to oppose the tendency toward death. Many, however, have lost these forces to such an extent that there is little or no help. In other cases, a little aid to the weakened lungs will make all the difference between sudden death and many years of useful life.



## GOOD HEALTH.

## "Printing a Resistant Occupation."

A paper published in Lima, Peru, under the same heading, says:

When the yellow-fever epidemic in 1863 created consternation here, the Typographical Union had only to pay the expenses for two members, and both of them recovered. Now, to-day, the same incident is recorded in Chili with respect to cholera, where we find that, according to the report of the President of the Typographical Union of Valparaiso, up to the date of his last report, not one of the hundred members of the union had been attacked. Thus they enjoy the same good fortune they had experienced during the previous year.

The writer's experience in regard to the above does not verify the remarks of the Lima journal. It was his fortune to be acting as foreman in the *Placer Times* office at Sacramento during the cholera season of 1850-51. Out of nine men employed in the composing-room of that paper at that time, four succumbed to the dread disease. That city probably suffered a larger decimation from cholera than ever befell any other civilized city in the world. The estimated deaths were about one in five in the three or four months during which the cholera raged there at the time referred to.

## Health of the State.

The monthly report of the State Board of Health for April contains reports from 85 towns and cities, containing an estimated population of 709,550, in which occurred 1005 deaths—a percentage of 1.4 per 1000 during the month of April, or an average of 16.8 for the year, which, says the report, "will compare favorably with that of any State in the Union. Our greatest mortality is derived from visitors from the East, who, with diseased lungs, seek this coast in pursuit of health. Without this constant addition to our death rate our percentage of mortality would be wonderfully small."

Lung diseases—consumption, pneumonia and congestion of the lungs—were fatal in 144 cases.

The genial weather during the month is credited with having a marked influence in diminishing the spread of such diseases as the smallpox, measles, scarlet fever and whooping-cough.

**Diphtheria.**—An outbreak of diphtheria is noticed for the town of Rocklin, which, however, does not appear to have been very severe, as no deaths are reported, although 41 cases were reported as having been brought to the attention of the profession. The cause of this epidemic is accounted for by the report as follows: "The origin of the disease was traced to a family whose sanitary condition was of the worst possible description. From this family it was communicated to neighbors' children, who were playing close by. Another factor in the spread of the disease was an open sewer or ditch, that was used as a receptacle for a large portion of the filth of the town, and from which was constantly exhaled a most offensive odor. Owing to the comparatively dry winter, this drain was not washed out as usual by the winter's rain, and hence its putridity. If an example was needed of the close relation that filth bears to disease, it may be found in the history of this epidemic in Rocklin. Founded in filth, fostered in an insanitary home, the germs cultivated and diffused by the decomposition of animal and vegetable matter in an open ditch, polluting both air and soil, the result could be no other than it was, with its attendant deaths, that might have been prevented."

**Smallpox.**—Of this malady the report speaks as follows:

Although its area of extension has been much contracted by vaccination and revaccination, it still exists in some parts of the State. In San Francisco during the month 22 cases were reported, three of them being directly imported from China. Two cases were reported in San Benito, two in Siskiyou. Cases were reported in San Andreas, two of them in the county jail. The disease was also in Sheep Ranch, West Point, with sporadic cases throughout Calaveras county, except in Murphys and Angel's Camp, which are free of it. In Oakland there were four cases during the month, all convalescent, without any further developments. In Stockton, Dr. Rugglee writes the disease is "stamped out" since March 24th. In Homestead, outside the city, there have been ten cases during the month, all convalescing.

**Cancer.**—Twenty-five deaths are credited to this dread malady, 15 of which are located in this city. It is a matter of much regret that the antiquated and iron-clad code of ethics to which the medical faculty of the allopathic school cling with so little reason and yet with such strong pertinacity, should so operate on the minds of our health conservators as to forbid all inquiry into a course of treatment for cancer employed by a member of a sister association in this city. That treatment has often been referred to in these columns, and a large amount of proof presented which to the minds of many of the most intelligent of our non-medical citizens is considered incontrovertible, and yet the Medical Association of this city and county refuse even to consider it. Numerous

patients who have been under treatment—many by the knife and all by our most experienced physicians and surgeons without avail—have subsequently submitted themselves to the treatment referred to and been perfectly cured by constitutional treatment without the use of either knife or caustics. Many such, after recovery, have gone to the physicians to whom they have paid their money, and asked them in the name of humanity to satisfy themselves of such cases, which they had previously pronounced incurable—but in all cases have met with rude rebuffs—for such action is demanded by the "medical code of ethics"! Instances of this kind may be found in this city of eight or ten years' standing and no symptom of a return of the malady.

Many cases have come to our knowledge where sufferers, after having made up their minds to submit to the new treatment, have been drawn away by the specious arguments of their medical friends—and in every case that has come to our notice, to a fatal result.

It has been suggested that since the Medical Association have refused to inquire into the truth of the alleged cures, the city and county or State authorities should appoint a Medical Board of Inquiry into this matter. There would be no difficulty in securing an efficient Board to act under such authority, although physicians of standing would hesitate to act in their individual or self-associated capacity. We trust this growing feeling will soon take practical shape, to the end that either science and humanity may be advanced thereby, or the claim for success in the treatment referred to be shown to be groundless.

**DISEASES OF WINE-TASTERS.**—A German medical paper says: The diseases of wine-tasters were studied by Donnet of Bordeaux and Dr. C. Marandon of Dijon. Wine-tasters are frequently suffering with disturbances similar to alcoholism, although the claret-tasters do not swallow the wine, but on the contrary reject it and even rinse their mouths afterward. In one case of Dr. Donnet's a man 32 years old used to taste every day 30 or 40 samples of wine, occasionally liquors and rum, without ever allowing any part of them. After two years he became very excitable, lost his appetite, did not sleep well, and suffered with disturbances of sensibility, pains in the breast, a feeling of weakness, difficulty in breathing. He improved after abandoning his profession, although a nervous debility still remained, as noticeable by the facility with which he was set in tears. Another statement made by Dr. Donnet is the great number of apoplexies in Bordeaux, where many persons drink  $\frac{1}{2}$  liters of wine with each meal. This number exceeds the number of apoplexies in any city of the world. Dr. Marandon did not notice any symptoms of intoxication in Burgundy tasters, although some of them would swallow the sample. He remarks that tea-tasters always swallow some tea, and this fact, he says, explains the nervous symptoms they are affected with.

**THE PRESENCE OF SEWER-GAS** in a room may be readily detected in the following manner: Unglazed paper is saturated with a solution of acetate of lead in rain-water—one ounce of lead-salt being dissolved in eight ounces of the liquid. Allow the paper to partially dry and then expose it in the room which is suspected of containing the deleterious gas. The presence of any considerable quantity of the gas will turn the paper black.

## USEFUL INFORMATION.

## Bee Stings.

## Some Interesting Points About the Busy Creature.

It is a common mistake to suppose that an angry bee is certain to sting on alighting upon a human hand. On the contrary, she will always examine the skin very carefully first with the palpi—very delicate and nervous feeling organs, which are situated near the sting. It may seem that she stings at once, and without care or reflection; but a bee can do a great deal in a very short space of time, in proof of which it may be mentioned that "she can flap her wings more than 400 times per second, and that each flap involves the extension and contraction, through a nerve impulse, of the muscles employed in the wing movements." This being the case, as Mr. Cheshire says, "we shall see at once that the 'no time' difficulty is removed." When a person has been stung by a bee, he should remove the sting immediately, "if possible, by the nail, running it in the direction opposite to that by which it has entered." On no account let him take hold of the sting with his thumb and finger, or a forceps, for then he will probably squeeze more of the virus into the wound from the poison-bag, which is generally left attached to the sting. Although the virus of a bee-sting is a strong acid, it does not always follow that an alkali will cure it. Much depends upon the temperament and constitution of the patient, and, while *Arnica montana* and *Ladum palustre* will give relief in many cases, in others they are injurious. We may dismiss the subject of bee stings by giving the young beekeeper two pieces of comfort—the first, that at evening-time bees are nearly always in an exceedingly good temper; the second, that each time he is stung he will probably become less susceptible to the effects of bee poison.—*Saturday Review*.

**PROGRESS OF THE UNITED STATES.**—Probably no one thing will give a better idea of the progress of this country than the following facts in regard to our postal service: The immensity of the United States postal service is not easily comprehended. The sum to be appropriated for its maintenance during the year ending June 30, 1889, exceeds \$60,000,000, and of this formidable aggregate all but \$2,500,000 is derived by the department from its own revenues. The extraordinary growth of the country during the last 50 years is indicated by the fact that in 1839 the postal revenues were less than \$8,000,000. The present expenditure for railway transportation of the mails is \$19,000,000, their weight being the basis of compensation. On seven of the great trunk lines there is now carried an average daily weight of 578,934 pounds of mail matter, or 289 tons. The deficiency in receipts as compared with expenditures during 1889, according to the estimates, will not be half of what it was in 1876, when the latter postage was 50 per cent higher.

**EDUCATION AND POPULATION IN JAPAN.**—The people of Japan are greatly interested in the education and elevation of women. In 1887 there were 128 new schools and societies for girls and women established in that country. These are in addition to the public schools, which have long existed. Considering the density of population in Japan, the small number of populous towns is very striking. Only five have a population exceeding 100,000, namely: Tokio, 900,900; Osaka, 313,890; Kioto, 255,400; Nagoya, 126,930; and Kengawa, 104,320. Six only have a population between 50,000 and 100,000. This peculiarity in distribution is due to the circumstance that Japan is not an industrial, but an agricultural country. At the date of the last census there were 8898 Japanese abroad, of whom 4356 were in Corea, 2068 in China and 817 in America.

**A MAMMOTH ENGLISH GRAPEVINE.**—The largest specimen of a growing vine in Great Britain is a Black Hamburg vine in Kennell, in Perthshire, Scotland. This vine, planted about 56 years ago, has a main stem 22 inches in circumference and completely fills a glass house 270 feet long, and is still growing as rapidly as ever. Its yield last year was 2548 bunches, of which only about 500, averaging about two pounds each, were allowed to mature. A substantial subsoil of leaf mold was used when the vine was planted, but the only extra material which the vine now receives is broken bones in half-inch pieces. This vine exceeds in size the famous Black Hamburg at Hampton Court, the principal branches of which are about 110 feet long, though its trunk is 38 inches in circumference.

**WEALTH IN SCHOOLHOUSES.**—There are to-day in the five States of Ohio, Indiana, Illinois, Michigan and Wisconsin more than 50,000 schoolhouses, in which schools are maintained from three to ten months every year. The value of these buildings, with the grounds, is considerably over \$80,000,000, which is more than one-half that of all other public-school property in the Union. Nearly 3,000,000 children annually receive instruction in the public schools, while more than \$5,000 teachers, a large number of whom have been trained especially for their work, are employed as instructors. The total amount expended each year for the support of these schools somewhat exceeds \$32,000,000, or more than \$8 for each child of school age within the States.

**LOW COST OF PIG IRON ABROAD.**—Those who doubt the statements made concerning the low cost at which pig iron is made at some points abroad may be shocked to learn that the Ilse de Huette and Paine Walzwerke of Germany, according to their annual report, produced pig iron at \$5.57 per ton. The works made 114,000 gross tons of pig and converted 105,000 tons into steel. The dividend was 20 per cent, against 10 per cent during the previous year. It is easy to calculate from the above the quantity of iron which could be made in this country if it was admitted duty free from abroad.

**POWER FROM ARTESIAN WELLS.**—Heavy machinery is now run by artesian well-power in many parts of France, and the experience of the French shows that the deeper the well the greater the pressure and the higher the temperature. The famous Greenelle well, sunk to the depth of 1800 feet, and flowing daily some 500,000 gallons, has a pressure of 60 pounds to the square inch, the water being also so hot that it is used for heating the hospitals in the vicinity.

**A HEAT-RETAINING SOLUTION.**—In answer to the query, "What substance can be dissolved in water so that it will retain its heat longer when need to fill foot-warmers?" *Science News* answers: "A saturated solution of acetate of soda in hot water has been used for this purpose. It will retain its heat a long time, or until the acetate of soda has crystallized. It can be used over again indefinitely by reheating till the crystals are dissolved."

**FUMIGATION** is said to have originated with Aaron, a physician of Agrigento, who is said to have first caused great fire to be lighted and aromatic to be thrown into them to purify the air, and thence to have stopped the plague at Athens and other places in Greece about 573 B. C.

## Tulare Minerals.

The mineral resources of the mountains, which have been little prospected up to the present time, will some day furnish employment for a large population. Lime of the finest quality is abundant on the branches of the Kaweah, also an excellent grade of marble. Other stone suitable for building purposes is found in the neighborhood. Among the higher ridges of the range, about the headwaters of the river, a little prospecting has been done and the region is found to be a promising one. Gold, silver, copper, iron and lead are found, but the only place any mining has been done is at Mineral King, and there on a small scale only. The ore is rebellious, but some of it is very rich. It is claimed that zinc and tin have been discovered in the vicinity of Three Rivers, but no well-defined lead or deposit has yet been located. Plumbago exists in large quantities higher in the mountains, and the list of valuable minerals might be extended indefinitely.

It was in search of mineral specimens suitable for cabinets that three gentlemen, under the leadership of a scientist, sought the mountains. They were fortunate in having for a guide Mr. Orlando Barton, whose farm adjoins that of his father, Mr. James Barton. Soon after the party crossed the river from Mr. Bartwell's place they started out to climb the mountain, led by Mr. Barton as guide. He has resided many years in the Three Rivers country, is thoroughly acquainted with every ridge and canyon for miles around, has an excellent knowledge of minerals, and but for him the trip would have resulted in anything but success, owing to the fact that the evening of the second day would have to find the party again in Visalia. Another and longer tramp was taken the next morning, and it was discovered that prospectors have located numerous ledges of ore, but that little development work has been done on any. An overhauling of the "finde" before starting on the return trip showed that there had been gathered samples of copper ore—azurite and malachite—aragonite, limonite or bog iron ore, manganese, epidote, tourmaline in feldspar and quartz, crystallized lime, apatite, graphite, epidote crystals and garnets in quartz, also in copper ore. In places, garnets occurred in masses firmly cemented together. Other specimens were found, many of which were interesting, and to the collector valuable. A thorough investigation of that region would reveal much more of interest to the mineralogist. It may be mentioned that one who was a collector of Indian relics did not come home empty-handed, the Messrs. Barton having presented him with a number of stone implements which they had found in their own garden and orchard.—*Visalia Delta*.

**THE WATERMAN CASES.**—The Circuit Court has granted an appeal to the United States Supreme Court in the cases of Abbie L. Waterman against Governor Waterman and J. L. Porter. The cases were recently decided against defendants in the Circuit Court. In the former case \$70,000 bonds were required and in the latter \$12,000. Plaintiff claims that on May 14, 1881, Governor Waterman gave a contract to his brother, J. S. Waterman, to transfer to him or his heirs, on demand, any time within 12 months, an undivided 24 1/100 interest in the Alpha, Omega, Silver Glen and Front mines in San Bernardino county. At that time he owed his brother \$11,753.64 for money loaned. J. S. Waterman afterward advanced the Governor a loan of \$26,317, to be used in developing the mines. He was to be repaid out of the first earnings of the mine, besides receiving a 24-100 share in them. J. S. Waterman subsequently died, and his widow, Abbie, brought suit. It is claimed that the total amount which the Governor owes plaintiff is in the neighborhood of a quarter of a million.

**THE TRUCKEE RIVER.**—Where the Truckee river leaves Lake Tahoe it is 50 feet wide, has an average depth of five feet, and has a velocity of six feet a second. This would give a flow of 123,120,000 cubic feet, or 923,400,000 gallons, in 24 hours. This alone is an immense never-failing body of water, for about 100 streams, great and small, feed this lake, not to mention a great number of living springs, hot and cold, or many that rise from the bottom of the lake. After leaving Lake Tahoe, over 60 creeks of all sizes fall into the Truckee river before it reaches Reno. The more important of these tributaries are in California, and of these the following are those affording most water: Bear creek, Squaw creek, Silver creek, Hard Scrabble creek, Donner creek (which carries the surplus water of Donner lake), Cold stream, Prosser creek, Martie creek and the Little Truckee, which enters the main Truckee at Boca. These many large creeks add immensely to the volume of water with which the Truckee begins its course on leaving Lake Tahoe. At its head, at the lake, the Truckee is 6216 feet above the level of the sea; at its mouth, where it empties into Pyramid lake, it is still 4000 feet above sea level. The fall of the stream between Lake Tahoe and Pyramid lake is 2216 feet.—*Truckee Republican*.

NEVADA sheep are finding summer pasturage in Mono county, California, and the owners willingly pay the license tax of five cents a head.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**HOLLYWOOD MINING CO.**—*Ledger*, May 19: This company is applying to have its stock listed on the New York Stock Exchange. It was organized last year, with a capital stock of \$200,000, divided into 100,000 shares at \$2 each. It includes two mining claims, one called the Elephantine and the other named the Merrimac. They are located at Middle Bar, in this county. The former is a short distance from the mouth of the big tunnel, and the latter is in Hunt's gulch, about half a mile from the Mokelumne river. Both are undeveloped.

**MISCELLANEOUS.**—H. P. Holland has sent a carload of ore from the Matson mine to the reduction works at Melrose, Alameda county, for treatment. He is interested in the bond which was recently given of this property. He is sanguine of it proving a paying mine, under his peculiar method of working the ore. He is of the opinion that it ought to yield at least \$7 per ton, and this would leave a splendid margin of profit, as it can be mined and reduced for \$2 per ton. Should the test carload just shipped turn out favorably, it will not be long ere a mill of the new pattern is erected on the property. His method is claimed to be an immense improvement on the old stamp system. It dispenses with water as an agent in crushing, and also with quicksilver. It is said that a yield of 90 per cent of the assay value of any kind of gold-bearing ore can be guaranteed by this process. A contract has been let to run the tunnel 150 feet further at the Vulture claim in Hunt's gulch. This claim is owned by Jas. Landers and L. Newman. Martin White has taken the contract at \$3.25 per foot, and is now at work on the same. The tunnel is in 60 feet at present, and the new contract will carry it a total length of 210 feet. It is the intention to sink the shaft of the New London mine, near Plymouth, 200 feet deeper, before proceeding to the erection of a mill. The thorough method of prospecting this claim is without a parallel in the history of mining in this county. The shaft is now down over 1000 feet, with drifts run at various points. But the owners, who are wealthy men of San Francisco, do not shrink from any expense in developing the property, and have concluded to go 200 feet deeper, to see how the ore body holds out at that depth, with a view to a better understanding of what sized mill should be erected. The Plymouth Consolidated remains in statu quo. It is now reported that the shaft will be opened the first of next month. The Bunker Hill mine is reported to be looking better than at any previous period of its history. The mill is kept running to its fullest capacity, supplied from the tunnel on the Mayflower ground as well as the Bunker Hill mine.

## Butte.

**FORBESTOWN.**—*Cor. Oroville Register*, May 19: The Goldbank quartz mine owned by W. W. Stow & Co., of S. F., has a Huntington mill with a capacity of from 20 to 30 tons of ore per day, rock breakers, and two concentrators for saving the sulphurets which assay very rich. The machinery of the mill and hoisting works is run by five "hurdy-gurdy" water-wheels under a pressure of several hundred feet from the Forbestown ditch. About 20 men are kept steadily employed day and night in three shifts of eight hours each. Directly across the ravine and on what is really the same ledge is the Golden Queen, owned by C. J. Nickerson. He is in about 300 feet with a tunnel and is seeking to get perfect drainage before putting up his mill. The tunnel runs straight and is smoothly and solidly timbered. He has a large force of men employed and it is his intention to erect a mill this summer. It is rumored that the Shakespeare mine, owned by Belding, Vail & Nickerson, has been sold to S. F. parties and that extensive operations will shortly be commenced. The country surrounding Forbestown was in the early days one of the richest placer gold fields in the State. These, however, are now worked out, but the hills are ribbed ledges of gold-bearing quartz, and there is little doubt that at no distant day the caoyos will resound with the roar of many mills.

## Calaveras.

**HIGHER WAGES.**—*Mountain Echo*, May 16: If the standard rate of wages paid to miners in Amador county, and the majority of northern mining camps were adopted in Angels, the laboring man could live happily and meet the monthly accoutments of his creditors; the camp would thrive, and live and let live would be the watchword. Miners would feel encouraged and work with a vim and accomplish more in one day than a day and a half under the low rate now being paid. We hope the time will soon come when the laboring man will command a just consideration for his work in the mines of Angels. At the present prices asked by our merchants for the real necessities of life, it is impossible for a man of a family of from three to five, to keep the wolf from the door at the present low rate of wages.

**THE CONFIDENCE MINE.**—The Confidence mine in this town, is kept running in full blast day and night, and the shaft is being sunk as rapidly as circumstances will permit. The ore in the bottom of the shaft prospects well. The owners are sanguine that they have a valuable property in their possession, and such is the opinion of all familiar with the past history of the Confidence. We understand that it is the intention of the owners to erect a 20-stamp mill as soon as the mine is got in readiness for stopping.

**HIDDEN TREASURE.**—*Calaveras Chronicle*, May 19: The work of development at the Hidden Treasure, owned by Messrs. Hoolbrook & Blair, and situated near the Mokelumne river on the Amador side, is progressing favorably. A ditch, 1½ miles in length, for the purpose of conveying water to the mine has just been completed, and everything about the mine is being put in first-class working order.

**SINKING.**—Wm. Sales, E. q., of this place, has a force of men at work sinking a shaft on the Quaker City extension, recently purchased by him. As depth is attained, everything indicates a favorable development.

## Fresno

**NEW COAL FIELDS.**—*Fresno Expositor*, May 16: A. C. Welch and W. H. Morgan have returned from the mountains west of Huron, and report that they

have found three different coal measures in that country. The first was in Walton canyon, where the lead is a very promising one. After locating a claim the party went up Sulphur canyon and succeeded in finding another which promises to develop into a vein of four or five feet in thickness. Having located a claim at that point they then moved on some 15 miles to the Arroyo del Pulvero, where they found still another lead and located another claim. This also promises to be a very rich vein of coal. They brought back specimens of coal taken from these different places that indicate that valuable coal measures have been struck. It is all south of the Robinson & Rawlins mine west of Huron, and indicates that the Fresno coal measures are not only extensive, but very valuable.

## Nevada.

**AMONG THE MINES.**—*Nevada Herald*, May 11: A. S. and A. R. Lord have about 75 tons of ore on the dump at the Spanish mine, which they have taken out while sinking the incline deeper. The owners intend to put up a mill this season. The shaft on the Champion mine is down 35 feet below the 200-foot level, and the rock at that point is looking first rate. Drifts are being run in both directions from the shaft on this level. Messrs. Ellison and Tremaine are running a tunnel to open up a drift mine for Thomas and Harris, out on the Blue Tent road. Messrs. Webber and Murphy are working a drift mine about 1¼ miles west of town. They have good gravel at present, and as the deposit is an extensive one, it is expected the claim will be a permanent one. They commenced drifting last July. They will complete a drain tunnel, when the mine can be worked to better advantage than now. Danion & Co., at the North Merrifield, have put up heavier machinery, and are now sinking for another level. The prospects continue first-class. Fallon and Snell are prospecting for gravel in the Looe Star diggings. They have completed a tunnel 300 feet in length, and have reached the channel, and the gravel is said to produce well. Martin, Waters & Co. are sinking on the May Flower ledge, below the No. 1 tunnel. The tunnel is in 600 feet, and the winze from that level is down 40 feet. The ledge shows 2 feet in width and yields good milling ore. Five men are at work here. They are also working their flat ledge at 2 different points. This ledge is known to have a pay shoot 800 feet in length, varying in width from 6 to 18 inches, the rock from which is pay. Four men are now employed, and are taking out about a ton of ore each per day. About 2000 feet distant, tributaries are also working on this ledge, and are doing well. They commenced on Monday to crush 80 tons which they have taken out. The company are running tunnels which will open up these ledges from 200 to 250 feet deeper than the present workings of the mine. Great confidence in the future of this property is expressed by the owners. Mr. Boniole is preparing to work his mine through Gray's upper tunnel, out on Piety Hill. The Dower claim, on Piety Hill, is not a bad thing to have. He has taken out crushing after crushing which has yielded from \$5 to \$6 a day. It was formerly known as the Wagoner mine, and was worked by Wagoner, then by Lovely & Co., and then by Sigourney & Johnson. The different parties took out considerable money. Like his predecessors, Mr. Dower has worked through shafts until recently. Now he has made arrangements to work through Gray's tunnel, these claims all being on the same ledge. He can now work out 250 feet of backs. He has just commenced to stoep, and as the ground is loose picking, the ore can be mined very cheaply. There is a pay shoot about 1000 feet in length. Mr. Dower is now working six men. Last Tuesday he finished crushing a lot of 60 tons of rock. All the rock between walls is worked and pays.

**THE DROMEDARY MINE.**—*Herald*, May 17: From one of the owners of the Dromedary mine at Grass Valley, we derive the following: The Dromedary mines are situated on Winchester Hill, near Wolf creek, Grass Valley. This mine was worked until 15 years ago, and was of marvelous richness. So rich was the rock that specimens almost as large as a man's fist, and in which quartz was the exception, were often taken out. Finally it came into the possession of Mr. Berriman, Sr., but no effort was made to work it until recently. There are properly two ledges, called the Dromedary mines, but under the new company they will be known as the Berriman Consolidated. The present depth of the working is 250 feet. The new company are now making extensive arrangements toward the improvement and working of the mine. They are negotiating for a part of the machinery at the Allison Ranch and New York Hill mines, and this machinery will be used in the construction of the mill and hoisting works about to be erected. They are about to introduce a new feature in this section—a quartz-mill and hoisting works run by electricity. The dynamo will be placed at the Merrifield mine near this city, and the circuit, which will pass the New Eureka mine, will be 7½ miles in extent. The motive-power for the dynamo will be obtained from the ditch extending from Deer creek to the Merrifield mine. The machinery to be used in the mine will be heavy, and will make much labor necessary. The company are now estimating the cost of various systems of electric power and will soon decide which system they will employ. It will take some time to complete all arrangements, but the owners hope to begin active operations in about six weeks. A force of 50 or 60 men will be employed, and the work of taking out pay rock will begin at the start. In conclusion we will state that the pay shoot of this mine was never lost, as has been reported. There is a strong ledge now showing in the bottom of the shaft. The directors of this new company are: Nicholas Berriman, N. C. Berriman, T. H. Berriman, B. F. Berriman and Elam Biggs.

**A GREAT MINE.**—*Grass Valley Tidings*, May 10: Monday, May 7th, regular monthly dividend No. 223 was declared by the Idaho Gold Mining Co. of Grass Valley. Amount of dividend per share \$35—aggregating \$46,300. To date, the Idaho has yielded \$11,000,000, one-half of which has been paid in dividends. Two hundred men, more or less, are employed by the company, and the wages paid these has been a great factor in Grass Valley's prosperity for years. The Eureka mine, now worked out, was located on the same vein and over \$5,000,000 was extracted. Of this amount \$3,000,000 went to the stockholders in dividends, and it is a matter of current knowledge that this unequalled vein extends into the Maryland Co.'s claim, adjoining the Idaho. Further: The rich ore extracted from the Idaho of late years has come from close up to, and even up

to the Maryland lines. We reiterate that the Maryland mine is to-day the best undeveloped mining property on the Pacific Coast if not in the world, and if Grass Valleyans permit the 40,000 shares in this mine offered for sale by the principal owner to be gobbled up by outsiders, Grass Valley will regret. Every cent of the money resulting from this sale is to be spent in opening up the mine. We sincerely believe that the development of the Maryland will prove as great a factor in Grass Valley's future prosperity as has been the Idaho in the past and as it now is. Hence our interest in the project.

**W. Y. O. D. MINE.**—*Grass Valley Union*, May 16: Moody afternoon the W. Y. O. D. mine started their new hoisting works. The machinery was placed in order under the supervision of Archie Nivens, Sr., and is all that can be desired for the amount of work that it is expected to do. We glory in the "spunk" of the young men who are operating the W. Y. O. D. Almost unaided, as far as financial circumstances were concerned, they started work on the property, built their machinery for hoisting and pumping, and now have their shaft down 226 feet. The crushings coming from the ledge have proven a source of profit to the owners of the mine, and just as their hopes were highest the hoisting works burned down, which event has delayed them in their efforts to develop the mine. The pump was put into the mine yesterday, and with their complete rig they hope to have the shaft clear from water in a short time. There are about 20 loads of ore in the bottom of the shaft, already broken from the ledge, and that will be taken to Larimer's mill to be crushed on Monday next.

**HAVE GOT THE CHANNEL.**—*Tidings*, May 18: At the meeting of the stockholders of the Planet gravel mine of Lowell Hill, held in this city a few days ago, Supt. William Keskeys was present with a portfolio of the fruits of a washing. Several quite healthy pieces of gold, including one weighing \$2, were exhibited. Mr. Keskeys and other old gravel miners declare the samples to be undoubtedly "channel" gold—they showing very plainly the worn, smooth, "washed" appearance of gold found in positive channels. It is quite likely that on driving the drift ahead a very rich streak will be uncovered.

**GRAVEL MINE CHANGES HANDS.**—The gravel claim situated at Howard Hill, comprising about 20 acres and known as the "Mother Neal," has passed into the possession of John L. Smith of this city, by purchase. Some years ago the mine was worked by the hydraulic process and for a time yielded very profitably, but a complication of difficulties in which the anti-debris agitation played a part, caused a suspension of operations. Of late, men have been drifting on the channel, and it is thought the pay streak is not far ahead. Drifting will no doubt be continued by Mr. Smith.

**GRAVEL MINE SOLD.**—*Grass Valley Union*, May 18: Yesterday John L. Smith purchased the Mother Neal gravel claim from Herman Kruse. The claim is located on Howard Hill, and consists of about 20 acres of land. Some 8 years ago considerable work was done on the property by hydraulic process, and for two winters the claim yielded handsomely. The drainage was not sufficient and the outlet channel soon filled up, then further work had to be abandoned. Of late miners have been drifting on the claim, and there is every indication of 5000 striking a rich drift gravel mine.

**GRAVEL.**—*North San Juan Times*, May 19: D. R. McKillican & Co. have for some time past been prospecting a gravel deposit at Snow Point. They struck a pay streak, but the yield has not been large enough to satisfy them. A cleanup was ordered for the early part of this week, when, if the result is not satisfactory, operations will be discontinued by the present management.

## San Diego.

**PACIFIC DISTRICT.**—*San Diego Union*, May 17: Milton Santee has returned from a visit to the Sunnyside mine, situated near Salton, in the Pacific mining district, in this county, bringing with him many magnificent specimens of gold quartz. The Sunnyside mine is the property of Mr. Santee and other San Diego parties, who have the greatest faith in the wealth of the mine. Steps are now under way to develop the mine.

## Santa Bernardino.

**SOUTH RIVERSIDE.**—*Los Angeles Herald*, May 16: Although a continuation of the citrus belt, South Riverside, with its unsurpassed site, has turned attention from citrus culture to the possibilities of great growth which lie in the development of the mineral resources which are opening up in the near and encroaching foothills of the Temescal mountains. The old Temescal tin mine will soon be fully developed, and a new mine has been discovered nearer the town. Of the value of these mines there is no doubt. The coal discoveries are of importance; so much so, that a New York syndicate has purchased one mine, which yields at a moderate depth remarkably fine coal. It is free from slate, with but few traces of sulphur, and burns to a fine ash. The vein is well opened out, and is from 25 to 30 inches in thickness. Other prospects have been found, and the miners are jubilant. A general exploitation of the foothills will be made, and a mining boom may be looked for in this land of promise where est but growing crops was the outlook. Prospectors declare that they have found gold and silver ore, but such statements may be taken *cum grano salis*. But they have found, besides coal and tin, an immense quarry of porphyry rock and an extensive mine of mineral paint or clay of the finest quality. Already the crushing machinery of the Porphyry Paving Co. is on the ground, and in a few weeks 75 men will be employed to the quarry. The mine of mineral paint will soon be worked.

## Shasta.

**CHROME.**—Mr. Jones, of the great Chrome mine, near Sim Southern, in this county, was in town Sunday. Some heavy shipments of the material have lately been made to the principal works for that kind of material in the United States, those at Baltimore. The product of the Shasta mine is pronounced the best ever received at the works. We understand that Mr. Johnson, who was one of the owners in the mine, has sold his interest to Clay W. Taylor and Sylvester Hull.

## Sierra.

**PIKE CITY.**—*Cor. Mountain Messenger*, May 16: Darn rumor has it that the Alaska mine will soon start up again under a new management. The Sunflower Co. are making steady headway with their

tunnel. Nels Hanson and J. McBride have struck good diggings in Grizzly canyon, below the bridge. Cunoingham & Culligan are taking considerable money out of their claim. The Red Ledge Co. are going to put up a mill, but, then, that is getting "cheesnutty."

**GOOD PROSPECTS.**—*Sierra Tribune*, May 18: Johnnie Williams and Johnnie Egbert were down from Gold Lake this week where they have been at work upon their quartz mine. They have a two-foot vein about 40 feet beneath the surface and excellent prospects are obtained therefrom. The snow was four feet deep at the claim when they left.

**NEW DISCOVERY.**—A new discovery was made in the Kentucky mine to-day. Your correspondent was shown some quartz taken out and the rock is literally filled with gold. It was found in the banging wall and is about two feet in thickness.

**SACRED MOUNT.**—Work is progressing finely on the new tunnel at the Sacred Mount mine. The ledge more than holds its own in size and shows sulphurets in abundance, besides considerable free gold.

## Siskiyou.

**BLACK BEAR.**—*Cor. Yreka Union*, May 19: Ball & Co. are taking rich ore from their Mountain Laurel mine. Scarcity of water is the great disadvantage under which miners will labor this season. Quite a number of prospectors are, at present, working throughout the mountains. Golden & Evelev have leased the Doe & Daggett quartz-mill and will crush about 50 tons of rich rock from their claim at the head of Eddy's gulch. From all indications this rock will pay handsomely. Night and day shifts are at work driving the Mystery tunnel, which will intersect the main ledge in about two weeks. The Black Bear Co. has struck the ledge in the middle tunnel and the prospects are favorable for an exceptionally prosperous season. Large quantities of ore will be allowed to remain in the mine until the narrow gauge road is completed.

## Trinity.

**DEADWOOD.**—*Trinity Journal*, May 12: Deadwood is one of the most prosperous camps in the State. Franck and McDonald Bros. are making considerable improvement in their mill. They are putting in 5 more stamps and 2 more concentrators, and are putting in a 60-horse-power Hazelton boiler in the place of the old boiler, and a 40-horse-power engine. The boiler is the only one of the kind in Northern California. It is claimed that it will save one-half in fuel and is in every way a superior boiler. The stamps weigh 900 pounds, and with the 10 stamps they will now have they will crush 15 tons of ore every 24 hours. The owners say nothing about the quality of the ore they are working, but there is every reason to believe that it is sufficiently rich to pay good monthly dividends. The expense of making the improvements above mentioned will reach nearly \$10,000, so everything that comes out of a mine is not profit. They expect to have the mill completed and in running order by the 20th of this month. The Brown Bear Co. is running on full time and everything appears to be in a prosperous condition. Supt. T. J. Houghton is a thorough quartz miner and what there is in the mine the owners will get the benefit of. Mr. C. H. Watt, one of the owners, is having constructed a comfortable dwelling which he will occupy as a summer residence. Gibson Bros. have put in a tramway to be used in taking ore from a lower tunnel to the dump at the mill. They are running their mill steadily on ore from the "Little Gem" with satisfactory results. The quartz in the Deadwood district shows permanency and the camp will probably be a bullion-producing one for years after the present generation has passed out of existence.

**THE HARDCRABBLE.**—*Trinity Journal*, May 16: Dr. C. W. Spratt, one of the owners of the above named mine, E. J. Fork, was down last week and tells us that the mine is showing well, and that development work is being done, it being desirable to determine the extent of the ledge before making any preparations for crushing. Knowles & Prigmore, who took a contract to run a 50-foot incline, were driven out by water before the work could be completed. They then commenced a tunnel and run 29 feet. A contract has now been let to R. Gruss to run a 140-foot tunnel, commencing where Knowles & Prigmore quit, which will give the tunnel a length of 159 feet, and will tap the ledge at a depth of 160 feet.

**HAY FORK QUARTZ.**—Mr. C. C. Shattuck of Hay Fork was in town last Saturday, and says that work is being pushed steadily on his quartz property in Hay Fork valley. He is now engaged in developing and opening the cyclone mine so as to get it into shape to be worked to advantage. Last winter he ran a tunnel crossing the vein and is now running two tunnels, one 250 feet higher than the other. The ledge in the upper tunnel is about four feet wide, with well-defined walls, the ore, however, is not high grade, but carries rich sulphurets; he has not struck the ledge in the lower tunnel yet, but will reach it shortly, and will then have plenty of stopping ground. During the past few months Mr. Shattuck has made no attempt to run the mill—a Huntington with a capacity of 8 tons every 24 hours—on full time, but crushes enough ore to pay running expenses, while he devotes the greater portion of his time and energies to getting the mine into shape.

## Tuolumne.

**VERY RICH.**—*Tuolumne Independent*, May 19: The Boonza boys struck it again very rich on Wednesday of last week, taking out \$4000, and on Thursday \$3000. On Monday they struck another bunch of \$6000. On Wednesday, from Tuesday night's work, they cleaned up over \$3000 more, and have been taking out large sums, more or less, every day this week. A rich vein of ore was struck in the shaft at the Platt & Gilson mine, Soulsbyville, last week. This mine has every appearance of being equally as good as the old Soulsby.

**MINING AND FARMING.**—The pay-roll of the Black Oak mine, for the month of April, amounted to over \$3600. What do the grunners, who decry our mining interests, think of this? This large amount is put in circulation by only one mine. How many ranches would it take to circulate this sum in one month? And how many farmers will it employ to raise supplies for these miners? These two interests go hand in hand, and it is only the ignorant, in either calling, who will decry the mutual interests of both farmers and miners. Mr. J. W. Wells, who has recently taken out large amounts of gold from the mine which he and several others have



leased, on Wolfing's Hill, is again getting good prospects, and hopes are entertained that another large deposit is near at hand.

**GRAVEL.**—*Independent*, May 16: We learn that the Kincaid gravel mine has commenced operations again. Repairs on the reservoir engaged the entire force of men of the mine last week. Messrs. McCann & Neal are making fine progress in their mine situated 1½ miles east of the Basin mine. The shaft is down 35 feet and the lead is 6 ft in width. It is thought by competent experts who have seen and examined the rock that it will pay \$25 per ton.

**MILL.**—Ten dies and shoes were shipped to the Quartz mountain mill Thursday. A large five-foot hoisting drum and anti-dint cog gearing were shipped this week to the Black Oak mine at Soulsbyville. This machinery will enable the company to sink to a depth of more than 1000 feet. The above machinery came from the Sonora foundry. The surveying for the new ditch designed to carry water from the Tuolumne Company's ditch, beyond Bald mountain to a place selected for a mill in the Dickson ranch, was completed this week. The Dickson ranch claim, situated about one mile east of Sonora, was sold one day last week by Mr. F. Dickson to Mr. R. B. Lane of Stockton, for \$2500. We are told that the lode varies in width from six inches to over two feet, and that some of the ore is of a very high grade.

## NEVADA.

### Washoe District.

**POTOSI.**—*Virginia Enterprise*, May 19: The east crosscut from south drift on the 550 level is in 53 feet; face is in quartz. The west crosscut from the south drift is in 52 feet; face in low-grade quartz. The south drift on the 550 level is in 523 feet, and the face is in low-grade quartz.

**CON. CALIFORNIA AND VIRGINIA.**—The 1435 level stopes are yielding and looking well. The old crosscut from the Con. Virginia shaft on this level is still in a mixture of ore and porphyry. On the 1500 level the upraise from the drift running north from the end of crosscut No. 1 is up 22 feet. It continues to show streaks of ore. Fine ore is being stoped cut near the south end of the mine on the 1650 level. Vein material giving low assays is encountered in the southwest drift from the main north drift from the C. & C. shaft. During the week the usual quantity of ore has been shipped to the mills on the Carson river, and the assays will average about the same as last week—about \$37 a ton.

**LADY WASHINGTON.**—Are raising in the 725 level and are now up a distance of 300 feet in clay adjoining the veins. Yesterday morning crosscutting was begun from this raise at a height of 110 and 210 feet above the 725 level. On the 500 level the west drift from the new station was extended 32 feet, and the south drift to connect with it from the top of the 600 level upraise, 25 feet. Are extracting about 100 tons a day of ore of good quality from between the 400 and 900-foot stations, and are shipping about 70 tons a day to the Rock Point mill. The battery assays are \$26.50 a ton. Bullion on hand amounting to \$18,000.

**GOULD AND CURRY.**—El Dorado tunnel 6. The southwest tunnel has been extended five feet; total length, 150 feet; formation, clay and quartz. Drain tunnel level. The southwest drift has been extended 36 feet; total length, 467 feet. This drift has connected with the northeast drift from the main west drift, making its total length 498 feet. During the week there has been extracted from the 250 and 300 levels and shipped to the Douglass mill, 189 tons and 400 pounds of ore, the average battery assays of which was \$28.40.

**ALTA.**—Are extracting ore from the 825 and 1150 levels. The mill is running steadily. It crushes 600 tons a month, which is as much as the four concentrators can handle. The Keystone shaft is down 150 feet and is raised to meet it (from the 725 level) is up 300 feet. In a day or two an engine capable of hoisting from a depth of 1500 feet will be set up at the top of the shaft, the hoisting having been done heretofore with a hand winlass.

**CROWN POINT.**—The face of the new crosscut from the point where connection was made between the 400 and 500 levels is still showing good ore. The east crosscut on the 600 level is in quartz containing many bunches of ore, some of which give very high assays. It is expected that a good body of ore will be found when a point is reached where the clay is concentrated.

**CHOLLAR.**—The southwest drift from the north-west drift on the 650 level is in 124 feet. The face is in low-grade quartz. The north drift on the 550 level is in 398 feet. The north drift, No. 2, on the 450 level is in 490 feet, and the face is in quartz showing spots of good ore. The north drift, No. 2, on the 650 level is in 92 feet.

**HALE AND NORCROSS.**—During the past week have hoisted 1521 tons of ore from the 600 and 700 levels, and have shipped to the Nevada and Mexican mills 1217 tons of ore averaging \$35 a ton. The stopes throughout the mine are looking well. Have bullion on hand and have previously shipped for this month \$18,000.

**BEST AND BELCHER.**—On the 425 level the west crosscut started from the main north drift near the south line has been advanced 39 feet. The formation is porphyry and quartz. El Dorado level: The northeast drift from the main west drift has been advanced 55 feet. Formation, quartz, clay and porphyry.

**CONFIDENCE.**—Good progress is making in the north drift on the 1000 level. It is now out 336 feet. About 200 tons a day are being shipped to the Brunswick mill, Carson river. The battery samples average over \$40 a ton.

**OPHIR.**—The east crosscut from the end of the southwest drift from upraise No. 2, 36 feet above the 1465 level, is out 200 feet in vein material giving low assays. The usual quantity and quality of ore is being extracted.

**YELLOW JACKET.**—Are shipping to the Santiago mill 100 tons of ore daily. A good deal of prospecting work is doing. Promising vein material is encountered at several points, with increasing assays.

**BELCHER.**—On the 1300 level the west drift from the top of the raise are still obtaining promising assays. Repairs to the 1300 drift, jointly with the Segregated Belcher, are making good headway.

**IOWA.**—For the past week ending May 18 the

south drift from the McBee tunnel has been advanced 22 feet; total, 87 feet. The face is in block porphyry, showing small seams of quartz and clay.

**OCCIDENTAL.**—Have completed the ditch and laying of the water pipe. Upper tunnel: Forty-five feet below this tunnel, in the boiler winze, have cut out a station and started a drift north.

**SCORPION.**—The south drift on the 300 level has been advanced 20 feet during the week, making its total distance 275 feet. There is no change since last report as regards the formation.

**SEGREGATED BELCHER.**—Good progress is making in the upraise and rapid headway has been made in the work of repairing the joint Belcher drift on the 1300 level.

**CHALLENGE.**—On the 1000 level the joint drift with Jacket is out 133 feet, and the face shows fair ore. The drift joint with Confidence, on the 1200, is out 291 feet.

**ALPHA AND EXCHEQUER.**—The west drift on the 122 is in a mixture of clay and porphyry, while the north drift continues in quartz and porphyry.

**UTAH.**—On the 372 level the south drift has been extended 55 feet; total, 105 feet. The formation is porphyry, clay and quartz, showing some value.

**BULLION.**—On the 640 level the two crosscuts, east and west, continues in quartz that shows low assays.

**BALTIMORE.**—The pumps are kept in constant operation and are fast raising the water from the shaft.

**SIERRA NEVADA.**—The main drift on the 520 level is out 1550 feet. The face is still in clay and porphyry.

**UNION CON.**—Crosscut No. 1, on the 1300 level, 100 feet north of the south line, is still in porphyry.

**MEXICAN.**—On the 1300 level the west crosscut is out 520 feet, with face in porphyry.

**ANDRES.**—Bunches of good ore are found in the north drift on the 240 level.

**WEST CON. CAL. AND VA.**—The steam hoisting plant is being erected at the shaft.

### Aurora District.

**STRIKE AT AURORA.**—*Esmeralda News*, May 19: A strike was made in the Durand mine, which is owned by an English syndicate, last Sunday that exceeds anything in extent and richness that has been made since the times a way back in the 60's, when Aurora was producing her millions and furnishing employment to thousands of miners. The new discovery was made by the day shift while following the ledge, which varied in width from 10 to 18 inches, down the shaft, or rather incline, and consists of a body of ore from 3½ to 5 feet wide that assays a way up in the thousands. Superintendent Ann is now on the ground, having arrived last Tuesday, and soon all arrangements necessary for the speedy extraction and reduction of the new find will doubtless be made. The operations of the company in Aurora have been very satisfactory, it having about \$20,000 in its treasury after paying all expenses.

### Santa Fe District.

**SILVER.**—*Esmeralda News*, May 19: John Faegan is going to work on the Lizzie mine, a silver proposition, within a few days. B. F. Smith has five men engaged in working on the Tip Top mine. In this mine there is a well defined silver ledge, which carries ore that will go all of \$90 per ton. Mr. Smith has a quantity of ore now on the dump and his men are busily engaged in taking out more. Joe Pasante, owner of the Comstock mine, is not allowing the grass to grow under his feet, but is using every means to bring his mine to the front. Ten tons of ore were shipped from the Comstock some little time ago, which netted the splendid sum of \$1500, that is \$150 per ton. Mr. Pasante expects big things from his mine, and present indications go to show that his expectations are not in vain.

### San Luis Obispo.

**A KAOLIN DEPOSIT.**—*Arroyo Grande Herald*, May 19: On the north side of the Le Point tract there is a deposit of light clay that is pronounced to be a very good quality of kaolin, the material from which porcelain is made. If this is true it will prove to be very valuable, the raw material being worth \$2 per barrel. The knowledge of minerals of this county is yet in its infancy and there is no knowing what value deposits may be discovered.

### Tuscarora District.

**DEL MONTE.**—*Times-Review*, May 18: The drift from the tunnel has been extended 34 feet on the vein, which continues as at last report, and is producing some good chloride ore.

**COMMONWEALTH.**—The 100-foot level south drift from the station has been extended 24 feet; the face of the drift is not looking so well, being somewhat mixed. The south drift, 150-foot level, has been extended 17 feet, still showing very high-grade ore. The drift on the east vein has been advanced 11 feet; total, 37 feet; the ore has improved and is good grade, about 14 inches wide, with every appearance of getting larger. The east crosscut from north drift has been advanced 20 feet, encountering seams of black clay with small seams of sulphurets mixed through it. Average of the ore extracted during the past week, \$256 per ton.

**NEVADA QUEEN.**—Upraise from north drift on the east vein has been extended up 20 feet, with very little change in the top. In putting in timbers along the level, the ore taken down is very rich, and shows a width of several feet.

**NORTH COMMONWEALTH.**—The work of tracing out the Found Treasure has been completed, showing the ledge plainly from inside the North Commonwealth lines all the way down and into the Found Treasure workings.

**NAVAJO QUEEN.**—East crosscut from north drift 200-foot level advanced 11 feet. A good deal of water is coming from the face, which shows many seams of quartz containing sulphurets.

**FOUND TREASURE.**—Work is being confined to the southwest vein, and to that portion of the northeast vein, the title of which is not in dispute.

**GRAND PRIZE.**—Ore hoisted and put in the mill during the week is of good grade.

**NAVAJO.**—The winze from the 250-foot level stopes shows some good ore.

**NORTH BELLE ISLE.**—The north gangway, 400-foot level, has been extended 13 feet; the vein shows very strong in the face and is increasing in width; the walls are firm and the ground looks very favor-

able for a good development of ore. The stopes have yielded their usual amount and grade of ore. **BELLE ISLE.**—The stopes look fair and have yielded as usual.

## ARIZONA.

**THE SILVER BELT.**—*Prescott Journal-Miner*, May 16: R. H. Burnister and H. C. Church came in last evening from a visit to the Silver Belt mine, which is being worked by Fred. Little and George Olsen, under a lease, and report a big strike made there recently. This mine has already produced \$300,000, and from the present outlook will add millions to its record. Owing to litigation, work ceased on it some time ago, since which the former workings have been in more or less, and a new shaft was started by the lessees, a short distance from the main shaft. The site selected for sinking this new shaft was in an old opening worked by the ancient residents of this country, probably the Aztecs, and ore immensely rich was discovered, being almost pure silver. A cave occurred in the opening, and the work was abandoned at that point, and another shaft commenced further south. This is down now only to a depth of about 10 feet, but is in an ore body from 10 to 15 inches wide which goes \$400 in silver and carries a good percentage of lead. They have about four tons of ore now out ready for shipment. The present owners of this property are W. C. Bashford and R. H. Burnister, who owns two-thirds of it, and Sroule & McCrum of San Francisco, who owns the other third. There are three shafts on the property, one of which is 265 feet deep; one 250 feet, and the other 150. Levels have been run at 250 feet and 150 feet, and, as stated, previously to being closed on account of litigation, upward of \$300,000 was shipped from the mine. The character and extent of the ore recently discovered goes to show what has already been claimed for the property, that it is one of the best in this section.

## BRITISH COLUMBIA.

**JAMIESON CREEK MINES.**—*Kamloops Sentinel*, May 16: E. A. MacKenzie & Co., of Jamieson Creek mines, some 20 miles north of Kamloops, have bonded their property to a California syndicate, who have agreed to expend between \$3000 and \$4000 on the property within 90 days. If the syndicate desire to purchase the property at the conclusion of the option they have agreed to pay to each of the three owners the sum of \$15,000. The ore looks well and the prospects are encouraging.

**MINERS FOR ROCK CREEK.**—Miners are passing en route to the Rock creek mines. It is hoped the Government will soon commence work on the new road from Pentiction to those mines, and so give miners all possible advantage to develop their claims. The Cherry Creek M. Co. lately struck better prospects than ever. J. Morrison & Co. are down over 50 feet in search of the old Cherry creek silver lead. So far everything is satisfactory. Chinamen continue working placer claims on Cherry creek, and their number is steadily increasing—a sign there must be dust in paying quantities still.

## COLORADO.

**ORE.**—*Elk Mountain Pilot*, May 17: Paul Roche and Ira Cline brought some nice-looking quartz carrying gray copper, galena and zinc blende from the Grand Republic, Thursday night, and there is quite a body of it with every prospect of making a paying mine of the property. Wright & Frohn have moved up to the Lost Horse and will put in the summer there. There are a large number of prospectors at the hot springs waiting for the snow to melt in the mountains so they can get about. Metzler & Nicols started their mill at Irwin on Saturday last to see that everything was all right. They will commence in a few days for the season run as they have about 800 tons of ore on hand at present.

## IDAHO.

**NEW STRIKE IN ROSEBUD.**—*Wardner News*, May 16: Captain Horton came in from Osborn yesterday and expresses himself well pleased with the outlook of all the mines in that vicinity. In company with Mr. Alger he is pushing work vigorously on the Nellie lode, on which they are now sinking, and he says the property improves in appearance every day as depth is gained. The captain reports a big strike made a few days ago on the Knickerbocker lode. This property is owned by George H. Knight, and is located about 2000 feet west of the West Point group on Rosebud gulch, and is an immediate extension of the mines belonging to Horton & Alger. Captain Horton was searching diligently yesterday for some sacks. He declares he could not purchase one in Wardner, and says the same state of affairs exists in every camp in Coeur d'Alene.

**QUARTZ MILL.**—*Coeur d'Alene Record*, May 18: F. W. Day has made arrangements for the immediate erection at Murray of a small quartz mill, with plates, amalgamator and concentrator complete and of the latest and most approved designs. It will be erected just above Lyman Wood's planing mill and will be operated by water-power from Mr. Wood's flume. Work is to be commenced to-day. Part of the machinery has already arrived here, part is at Osborn, and the remainder, the concentrator, is on the road from San Francisco. The Centrifugal amalgamator will be used, and judging from its success in other places, it will prove a valuable aid in saving the gold in the tailings. It will be set up to-day and Jesse Coulter will give it a thorough test by running through it ten tons of Golden Chest tailings.

## DAKOTA.

**REDUCTION WORKS.**—*Deadwood Pioneer*, May 17: By telephonic advices received from Rapid yesterday afternoon, we are informed that the present test underway at the school of mines is progressing most satisfactorily. Fires have been started in the furnaces and no further delay is likely to occur. The test, however, will not be completed for three or four days, and while its result may be anticipated, nothing regarding it will be positively known before Friday. Confidence in the success of the enterprise, and the speedy erection of its plant, obtains abroad as well as at home.

**VISIONS OF WEALTH.**—The Deadwood corre-

spondent of the St. Paul *Globe*, writing of Prof. Clark's arrival and the proposed erection of leaching works here, says: "Visions of wealth greater than that possessed by Croesus, or coveted by Midas, tit by the fascinated gaze of vivid imaginations. Nor are such visions altogether visionary. Such eminent authorities as Riott, Blake, Carpenter, White and Clark himself, each of their men of wide reputation, who have examined and reported upon the districts to be directly benefited, have unhesitatingly pronounced that the discovery of an economical method to treat their ores would make the Black Hills one of the greatest producers of precious metals known to the world. The ore is here in vast, virtually inexhaustible quantities. Mining it is cheap, the formation in which it occurs enabling it in many instances to be quarried like limestone, granite or marble. The districts can now furnish 800 to 1000 tons a day, which will average \$25 per ton. The enthusiasm of the people is hereby explained. From \$20,000 to \$25,000 per day added to circulating wealth of the country, and all of it produced by properties owned principally by home people, is a thing calculated to excite self-gratulation, mutual gratulation and universal good humor."

**MORE TIN FINDS.**—M. Everly, who resides at Harney, was down from the tin districts yesterday and reported that another mountain of ore of the richest character had been recently discovered in the Harney district. He stated that, unlike the tin ores most common in the Hills, the new discovery did not contain large crystals, but rather fine tin so plentifully imbedded in the rock that the latter looked as if it were peppered full.

## LOWER CALIFORNIA.

**WATER SCARC.**—*San Diego Union*, May 17: T. J. E. Scoones has returned from Ensenada and the gold-mining regions of Lower California. Mr. Scoones asserts that the mines are as good as those of South Africa. He has in his possession gold extracted from the Valledaies district; also gold-bearing quartz which will average from \$40 to \$50 to the ton, and quartz from the Pueblo Rosario and Saragossa mines which has not been assayed. The great difficulty, however, to contend with, Mr. Scoones says, is the want of water, which will require a great deal of capital, time and energy to overcome.

## MONTANA.

**WOLF CREEK DISTRICT.**—*Great Falls Tribune*, May 16: Among the many promising mining districts in the Belt mountain range there is one which, from information recently obtained, bids fair to eclipse the others. We refer to the Wolf Creek mining district, about 60 miles southeast of Great Falls, in Fergus county, at the head of Running Wolf creek. The district was organized some five or six years ago, the first locations being the Sir Walter Scott and Mystery lodes, on the west side of the creek. The extremely rich and beautiful samples of ore from the croppings, assaying from 500 to 2000 ounces per ton in silver, immediately attracted the attention of every one interested in mining in this section, among others Mr. Paris Gibson, who secured a large interest in the property. The two claims mentioned contain 6000 linear feet by 600 feet in width. Development work has been quietly going on for the past year. The vein has been opened at three different points by shafts, and from 30 to 60 feet in depth, along the trend or course of the lead, proving the same to be continuous for at least a distance of 400 feet, and disclosing a defined vein from one to three feet in width, all good ore, and a portion of it of a very high grade, consisting principally of the carbonate and chloride of silver. Work is now being vigorously prosecuted upon the mine. There are many other very promising locations in the district which will no doubt develop into valuable mines, among which may be mentioned the Ried, Oxide, the Running Wolf and others.

**ALDER GULCH PLACERS.**—*Madisonian*, May 16: The placer mining season is somewhat later this year, but there are several of the claim owners who have begun work on their grounds. Abe Thurgood has been working some weeks on his Harris gulch claims; Alex. McKay is rushing off the gravel on his Biven's gulch mines, and the lower placers of Alder gulch are now in full swing of work. Notwithstanding the lateness of the season of beginning, a good summer's work is expected. The light snowfall of the winter is amply compensated for by the storms of the last two or three weeks, and there exists no doubt that the water supply, this year, will be fully up to the average.

## OREGON.

**SILVER CREEK.**—*Cor. Bedrock Democrat*, May 14: After 18 months hard work and an expenditure of several thousand dollars, D. C. Probasco has at last accomplished his purpose in completing a 160-foot crosscut tunnel to the ledge on the Heclaean mine, through the hardest of granite, and has run 16 feet into the lode with the opposite wall yet some distance ahead, and is now drifting south on a four-foot vein of ore, several of which were encountered in crosscutting, varying in width from a few inches to several feet, with clay gouge between them. In fact, the whole ledge seems a huge mass of gold-bearing sulphureted quartz. Col. Knowles has been forcing development work on the Eureka and Excelsior mines during the winter, resulting in several hundred feet of tunnels and 2000 tons of rich gold-bearing sulphureted quartz on the dump, and the opening up of a prospect which promises to become one of the chief of gold mines. A first-class road is now being built so as to admit of transportation of machinery to the mines. La Bellevue mine, owned by the two Cabell Bros., has, during the winter, produced upward of 100 tons of ore, with the development work of but two men, and over 100 tons of this is first-class shipping ore valued at from \$50 to \$250 per ton. Recent rich strikes, on nearly every prospect throughout this region that has been worked during the winter, have so stimulated prospecting that some of the ledges are being worked on every claim for miles along their course with the most flattering results; and so encouraging are the reports that a number of leading mining men of the Pacific Coast have been attracted this way for the purpose of investigating, all of whom express themselves satisfied beyond the most sanguine expectations, and compare the mines with such properties as the Ontario and Granite mountain.



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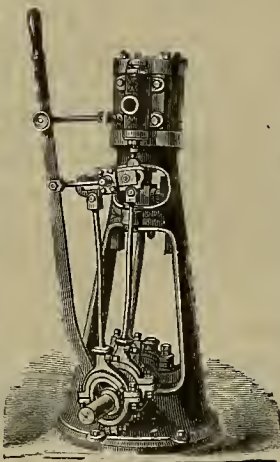
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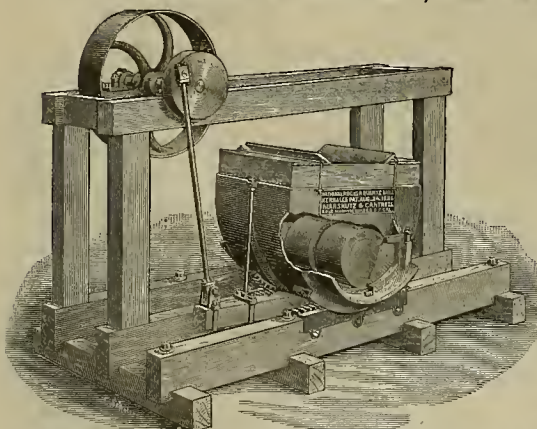
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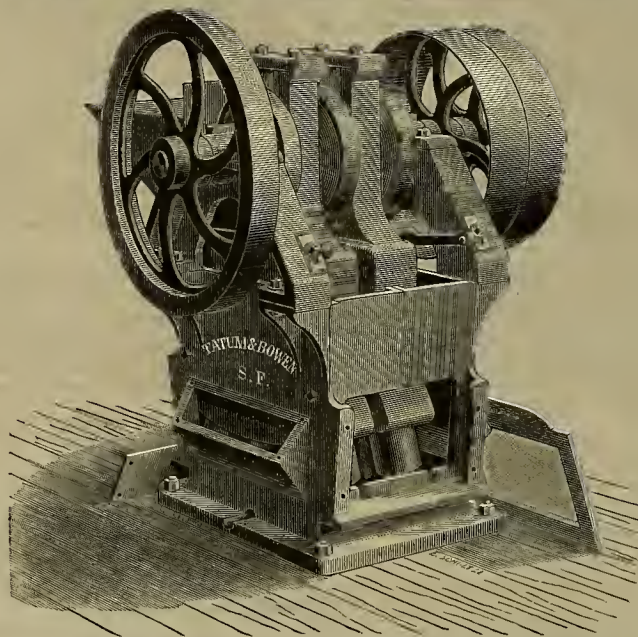
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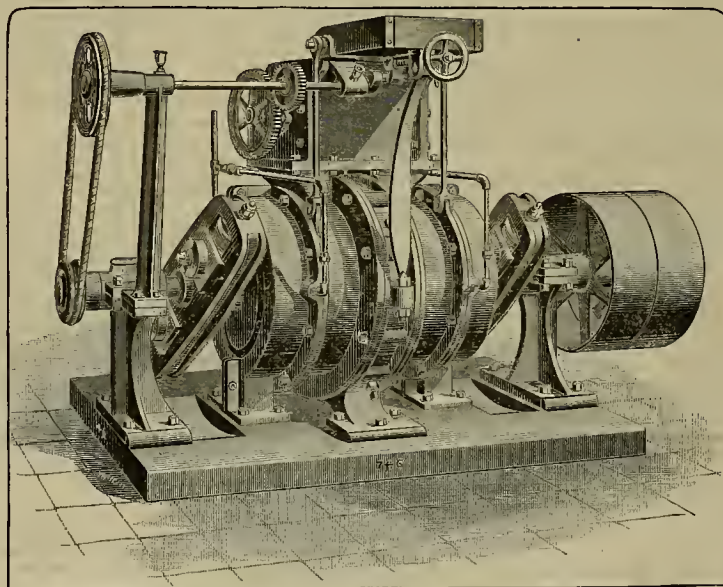
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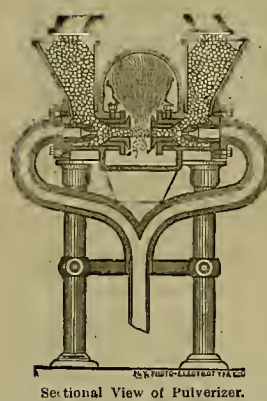
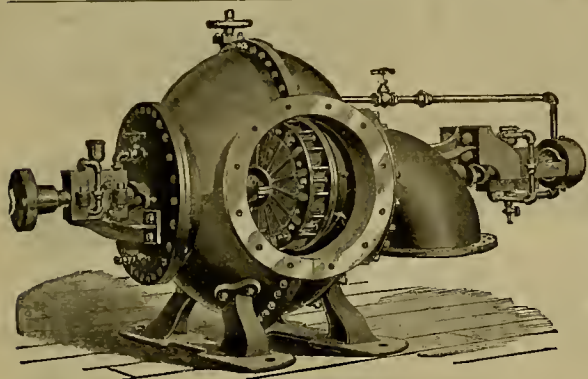
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## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING MAY 15, 1888.

- 382,681.—HEATER FOR BOOTS AND SHOES—Frank Batter, Slide, Cal.
- 382,857.—TRACTION ENGINE—Frank Batter, Slide, Cal.
- 382,799.—PIPE WRENCH—R. Copeland, Eureka, Cal.
- 382,961.—STALLS FOR HORSES ON RACE-TRACKS—P. A. Finigan, S. F.
- 382,969.—CABLE RAILWAY—Samuel Gibson, S. F.
- 382,970.—CABLE GRIP—Samuel Gibson, S. F.
- 382,973.—MACHINE FOR DISINTEGRATING BITUMINOUS SUBSTANCES—E. Groat, S. F.
- 382,763.—BUTTON-HOLE SEWING MACHINE—T. F. Hagerly, S. F.
- 382,989.—DEVICE FOR HITTING HORSES—C. Kauer, S. F.
- 382,815.—RAIL JOINT—J. V. Koss, North Yakima, W. T.
- 382,816.—SHIP'S LOG—O. Kustel, S. F.
- 382,844.—BABY-JUMPER—B. G. Lathrop, Oakland, Cal.
- 382,819.—CARBURETOR—Louis Marks, S. F.
- 382,822.—HAY-PRESS—F. McKinney, San Diego, Cal.
- 382,830.—CARTRIDGE-LOADER—John H. Read, S. F.
- 382,731.—DISK HARROW—L. A. Richards, Grayson, Cal.
- 382,736.—MACHINE FOR PULLING HAIR FROM FUR SKINS—E. Schroeder, S. F.
- 383,021.—BUTTON-HOLE OPENER—J. R. Stephens, Portland, Ogn.
- 382,783.—CAR COUPLING—U. L. Uhlenhart, Astoria, Ogn.
- 382,895.—ROCK DRILL—W. O'Keefe, Elliston, M. T.

NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**HAY-PRESS.**—Finch McKinney, San Diego. No. 382,822. Dated May 15, 1888. This is a "perpetual" hay-press, in which the hay is forced in successive charges into one end of a tube of proper form to shape the bale, the bales being removed from the opposite end as fast as they are completed. The patent covers several constructions and combinations of devices designed to simplify and improve this form of press.

**CARBURETOR.**—Louis Marks, S. F., assignor of two-thirds to G. Schlesinger and George Burkhardt. No. 382,819. Dated May 15, 1888. This improvement in hydro-carbon gas generators consists of a series of supposed shallow pans or chambers fitted within an interior containing tank, with means for supplying the chamber with the hydrocarbon liquid and a peculiar arrangement of perforated pipes and chambers through which the air is forced for the purpose of enriching it to form a gas.

**DISK HARROW.**—Lovell A. Richards, Grayson, Stanislaus Co. No. 382,731. Dated May 15, 1888. This is an improvement in that class of harrows or cultivators which are provided with gangs of oppositely inclined disks, the inner ends of the shafts of which have shutting humpers. The invention consists of an improved humpers to resist lateral thrusts, jointed swivel-pins or shafts upon which the inner ends of the disk-bearing shafts may turn, and a connecting rod and lever by which these inner ends may be adjusted so as to relieve the main bearing-hoxes of strain.

**TRACTION ENGINE.**—Frank Batter, Slide, Humboldt Co., Cal. No. 382,857. Dated May 15, 1888. This is an improved traction engine for hauling upon soft or yielding ground where wheels cannot be employed. It consists of endless belts composed of shoes arranged transversely and coupled together to form the belts, a framework upon which is mounted the engine, and rollers upon which the engine frame is supported, and in combination with this, of an intermediate endless chain of links which rest upon the outer shoes while the rollers travel upon these intermediate links. This is intended mainly for hauling logs and timbers.

**ROCK-DRILL.**—Wm. O'Keefe, Elliston, Montana. No. 382,895. Dated May 15, 1888. It consists of a drill supported in a cylindrical sleeve with mechanism by which it may be rotated, a carriage upon which this mechanism is supported, and guides upon which the carriage moves forward as the drill enters the rock; a series of spring handled hammers connected with a rotary wheel, so that their power may be applied to the end of the drill, and an elastic crank by which the wheel is turned. With this drill the hole is enlarged toward the bottom, which allows the fine powder to be placed where it will do the most good. All of the machinery of the drill is set behind it, so that it can easily be worked by one man in a hole or place which is too small to admit of

more than one person, and too small to be worked on any other way. It takes very little time to set this drill, and its work is claimed to be very rapid.

## HEATING APPARATUS FOR BOOTS AND SHOES.

Frank Batter, Slide, Humboldt Co., Cal. No. 382,681. Dated May 15, 1888. This is a device for inducing a degree of warmth to the feet. It consists of a heating attachment fixed within the heels of the boots or shoes and connecting wires or plates extending therefrom so as to conduct the heat which may be developed to other parts of the shoe. The heater may be of any suitable form. It may consist of a slowly-consuming material which will give out heat for some considerable length of time, this material being introduced in the cavity of the heel; or it may consist of a heated rod or har of metal, or the interior cavity may be heated by a match or lighted cigar at will. Only a small amount of heat can be generated by this device, but being conducted by wires around the foot, it will often suffice to render the feet comfortable and prevent many of the results arising from cold feet.

## CARTRIDGE-LOADING APPARATUS.—John H.

Read, S. F. No. 382,830. Dated May 15, 1888. This invention relates, broadly, to the class of packing machines, and especially to the machines used for packing dynamite, nitroglycerine powders or other pulverulent substances or material into cartridges or cases. The invention consists in an improved and novel connection between the source of power and the plunger or rammer of the machine, said connections consisting, essentially, of a sliding cylinder connected with the plunger or rammer and provided with a valve-controlled port for the entrance of the air, and relief ports controlled by adjustable pressure valves and a piston connected with the source of power and working within the cylinder, whereby said cylinder is reciprocated with gradually diminishing length of stroke, though with an equal and elastic pressure. The object of the invention is to provide for applying power to machines of this class in such a way as to obtain an elastic connection between the source of power and the plunger or rammer of the machine; to obtain strokes which, beginning at the same point, shall gradually diminish in length as the cartridge shells or cases are filled, and finally, to obtain strokes which shall produce equal pressure on the powder or other material being packed.

## Mining Share Market.

The stock market continues inactive, though active work, with good success, is going on at the Comstock mines. The Virginia Enterprise thinks that San Francisco has turned her back on the mining industry. It says: "As things are going down there it will be well for the people of Nevada to take pains to cultivate closer relations with St. Louis and other big cities of the East. Already these Eastern cities are getting a bold on the mining industries of the country, and are getting the lion's share of the dividends. Boston alone is even now close upon the heels of San Francisco, and in less than a year will pass her as a mining city and a promoter of mining industries."

"The total dividends of the four months of 1888, ending April 30, was \$6,519,828. Of this sum San Francisco received \$1,753,750; Boston received \$1,700,000; St. Louis, \$1,138,000; and New York, \$938,728. Thus it will be seen that Boston—so often twitted as being timid and penurious—is really ahead of New York City as a promoter of mining enterprises."

"In the month of April Boston received dividends amounting to \$650,000; San Francisco, \$288,750; St. Louis, \$224,500; New York, \$124,576; and various cities and places, \$289,000. That St. Louis received \$100,000 more than New York City, shows that she is the coming mining city for the people of the Pacific Coast States and Territories. St. Louis went into mining later than any of the other cities named, but already she is pulling up alongside them. She made lucky investments in the start, and while making money—not losing it—learned her lessons in mining. Her experts are among the shrewdest in the field, and after making sure they are right, they go ahead. Coin is always forthcoming for an enterprise taken in hand in that city."

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Chollar, May 21, \$9113; Confidence, 21, \$15,406; Eureka Con., 23, \$17,000; Germania, 15, \$2326; Hanauer, 16, \$1790; Germania, 18, \$3484; Hanauer, 18, \$4230; Germania, 19, \$1601; Hanauer, 19, \$2060; Savage, 18, \$4400; Con. California and Virginia, 19, \$60,401; Argus, 18, \$6023; Savage, 24, \$28,000; Hale and Norcross, 24, \$70,574.

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

JOHN G. H. LAMFARUS—Santa Barbara Co.  
G. W. INGLETS—Arizona Territory.  
A. F. JEWETT—Tulsa Co.  
C. E. WILLIAMS—Yuba and Sutter Co's.  
G. H. HUSTON—Montana Territory.  
G. D. CUMMINS—Butte and Tehama Co's.  
J. L. DOLY—Kern Co.  
W. W. THEOBALD—Contra Costa Co.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

## ASSESSMENTS.

COMPANY.	LOCATION.	NO. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.	
Alta M Co.	Nevada.	37.	50.	May 12, June 18.	July 9. W. H. Watson.	302 Montgomery St.
Arnold M Co.	California.	4.	75.	May 1, June 4.	July 26. A. Judson.	320 Sansome St.
Bulwer Con M Co.	California.	4.	20.	May 3, June 7.	July 5. L. Osborn.	309 Montgomery St.
Butte Creek Hyd M Co.	California.	12.	25.	Mar 27, May 7.	May 28. L. R. Levy.	213 Market St.
Baltimore S M Co.	Nevada.	1.	25.	Apr 10, May 21.	June 8. W. L. Brown.	302 Montgomery St.
Crown Point M Co.	Nevada.	46.	50.	Apr 13, May 16.	June 6. J. Newlands.	329 Pine St.
California State Co.	California.	1.	10.	Apr 18, May 24.	June 25. J. H. Hanson.	10 California St.
Gray Eagle M Co.	California.	7.	50.	May 1, June 2.	June 22. T. Wetzel.	522 Montgomery St.
Golden Prize M Co.	Nevada.	11.	25.	Apr 21, May 26.	June 16. G. D. Bennett.	328 Montgomery St.
Justice M Co.	Nevada.	46.	25.	May 7, June 11.	July 2. E. E. Kelley.	413 California St.
Mayflower Gravel M Co.	California.	41.	25.	Apr 9, May 14.	June 4. J. Morizo.	328 Montgomery St.
Nevado M Co.	Nevada.	19.	30.	Apr 12, May 17.	June 7. W. Pew.	310 Pine St.
Peerless M Co.	California.	11.	25.	Apr 4, May 7.	May 28. A. Waterman.	302 Montgomery St.
Paradise Valley M Co.	Nevada.	51.	15.	Apr 21, May 23.	June 18. A. Chemnitz.	328 Montgomery St.
Scorpion M Co.	Nevada.	25.	10.	May 15, June 22.	July 15. G. R. Spinney.	310 Pine St.
Sierra Nevada S M Co.	Nevada.	91.	25.	Apr 3, May 8.	May 28. E. L. Parker.	309 Montgomery St.
Trojan M Co.	Nevada.	17.	10.	Mar 27, May 1.	May 28. J. F. Holling.	533 Kearny St.
Tioga M Co.	California.	18.	25.	May 1, June 5.	June 27. L. Bushing.	309 Montgomery St.
Utah Con M Co.	Nevada.	4.	25.	June 2, June 26.	June 26. A. H. Fish.	309 Montgomery St.

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING.	DATE.
Alabama M Co.	California.	J. J. Smith.	5th & Stevenson Sts.	Special.	June 11
Seg Belcher & Miles Con M Co.	California.	E. B. Holmes.	303 Montgomery St.	Annual.	June 5

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE.
Con California & Va M Co.	Nevada.	A. W. Havens.	303 Montgomery St.	50.	May 10
Confidence S M Co.	Nevada.	A. S. Groth.	302 Pine St.	2.00.	May 10
Eureka Con M Co.	Nevada.	H. R. Hutton.	302 Pine St.	25.	May 7
Argenta S M Co.	Nevada.	J. W. Fox.	310 Pine St.	50.	May 7
Hale & Norcross S M Co.	Nevada.	A. H. Clough.	230 Montgomery St.	1.00.	May 7
Oregon Coal & Navigation Co.	Oregon.	R. B. Williams.	211 Sansome St.	1.50.	Mar 2
Pacific Borax, Salt & Soda Co.	California.	A. H. Clough.	230 Montgomery St.	1.00.	May 10
Standard Con M Co.	California.	J. W. Pew.	310 Pine St.	50.	May 12

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING May 3.	WEEK ENDING May 10.	WEEK ENDING May 17.	WEEK ENDING May 24.
Alpha.	2.35	2.70	2.25	2.60
Alta.	1.85	1.95	1.80	2.00
Andes.	1.50	1.65	1.50	1.70
Argenta.	6.75	7.25	6.10	7.15
Belcher.	4.50	5.25	4.50	5.10
Bulwer.	1.60	1.75	1.60	1.85
Bullion.	.75	.85	.70	.90
Belle Isle.	.60	.65	.50	.65
Bodie Con.	2.85	3.00	2.60	3.20
Benton.	2.50	2.50	2.00	2.50
Bodie Tunnel.	.55	.60	.50	.60
Bulwer.	1.25	1.35	1.10	1.40
Con. Va. & Cal.	12.15	13.15	12.15	13.15
Challenge.	8.25	8.75	8.25	8.75
Champion.	4.35	5.25	4.35	5.25
Chollar.	38	38	38	38
Confidence.	7.00	7.50	6.50	7.50
Con. Imperial.	.60	.65	.60	.65
Caledonia.	.60	.65	.60	.65
Con. Pacific.	1.15	1.20	1.15	1.20
Crown Point.	1.15	1.20	1.15	1.20
Crocker.	.40	.45	.40	.45
Central.	.30	.35	.30	.35
Dudley.	.30	.35	.30	.35
East B. & B.	1.05	1.10	1.05	1.10
Eureka Con.	1.45	1.55	1.40	1.55
Exchequer.	2.35	2.55	2.10	2.35
Grand Prize.	4.70	5.00	4.20	4.70
Gould & Curry.	8.25	8.75	8.25	8.75
Hale & Norcross.	8.25	8.75	8.25	8.75
Independence.	1.00	1.10	1.00	1.10
Iowa.	.50	.55	.50	.55
Julia.	.50	.55	.50	.55
Justice.	2.25	2.30	2.10	2.25
Katana.	2.65	2.80	2.60	2.80
Lady Wash.	.55	.60	.55	.60
Martin White.	1.75	1.85	1.75	1.85
Monoc.	1.45	1.55	1.45	1.55
Mexican.	4.30	4.50	4.30	4.50
M. D. Diabolo.	3.50	3.80	3.50	3.80
Northern Belle.	1.70	1.85	1.70	1.85
Navajo.	1.70	1.85	1.70	1.85
North Belle Isle.	5.00	5.50	4.50	5.00
Niagara.	4.15	4.20	3.80	4.15
North G. & C.	1.75	1.85	1.75	1.85
Occidental.	8.15	8.50	8.15	8.50
Ophir.	2.45	2.70	2.40	2.70
Overman.	4.05	4.45	4.00	4.45
Potosi.	1.80	2.00	1.80	2.00
Peerless.	1.80	2.00	1.80	2.00
Peer.	.75	1.00	.75	1.00
P. Sheridan.	5.15	5.75	5.15	5.75
Silver Star.	5.15	5.75	5.15	5.75
Savage.	4.60	5.10	4.60	5.10
S. B. & M.	4.00	4.50	4.00	4.50
Sierra Nevada.	4.00	4.50	4.00	4.50
Silver Hill.	.65	.75	.65	.75
Silver King.	.70	.75	.70	.75
Scorpion.	.70	.75	.70	.75
Syndicate.	3.35	4.25	3.35	4.25
Union Con.	1.75	2.00	1.75	2.00
Utah.	6.50	7.25	6.50	7.25
Yellow.	.75	.85	.75	.85

## Hydraulic Gravel Elevators.

The Hendy Machine Works of this city give us the following memorandum: We have at hand a letter from Hon. R. H. Campbell, dated Etna, Siskiyou county, May 20, 1888, regarding the further operation of the hydraulic gravel elevator, which we furnished for his use on the placer mining property of the Quartz Valley Mining & Stock Raising Company, as related in the issue of the MINING AND SCIENTIFIC PRESS of the 19th inst. In this letter Mr. Campbell writes as follows, viz:

"Had I known that you intended to make use of what I wrote concerning the elevator in my last letter, I could have said more."

"My faith in the hydraulic gravel elevator system of working such ground as mine has been greatly strengthened; in fact, all doubts that I may have entertained heretofore concerning their working have been dispelled, and what I have done with mine simply proves what can and will be done in the future at Quartz valley and its vicinity, for I have several hundred acres of rich ground that must eventually be worked by the elevator system, which will take more than a lifetime to exhaust, besides much more adjoining that must be mined by the same system."

"It is only a matter of a short time when there will be half a dozen or more kept constantly in operation near here. Nowhere on this coast do the same facilities and extent of ground exist to warrant the extensive use of hydraulic gravel elevators, as here."

J. A. JOHNSON, 307 Montgomery street) the Nevada Bank building) is the general agent of the Stiles quartz machinery, and offers easy terms for introduction.

## Sales at San Francisco Stock Exchange.

WEDNESDAY May 23.		200 Grand Prize.....	2.40
50 Alpha.....	1.75	80 Hale & Nor.....	.75
100 Alta.....	1.15	50 Iowa.....	.50
300 Andes.....	2.75	100 Justice.....	.70c
100 Baltimore.....	.80	100 Locom.....	.30c
50 Belcher.....	4.35	100 Mexican.....	.40c
200 B. & Belcher.....	4.00	110 N. Belle Is.....	.75
100 Bullion.....	1.40	500 Navajo.....	4.20
150 Bodie.....	2.60	70 Ophir.....	.75
450 Bulwer.....	.65c	100 Overman.....	1.30
300 Belle Isle.....	.60c	300 Peerless.....	2.45
20 Challenge.....	6.25	300 Peer.....	.90c
25 Chollar.....	3.35	250 Potosi.....	3.80
60 Con Va. & Cal.....	.11	50 Scorpion.....	.65c
400 Crocker.....	1.25	320 S. B. & M.....	.29c
50 Crown Point.....	.55	200 Sierra Nevada.....	.40
650 Con. Imperial.....	.40	120 Union Con.....	3.25
300 Central.....	.45c	120 Utah.....	1.50
100 Exchequer.....	1.20	100 Weldon.....	.70c
50 Gould & Curry.....	4.15	110 Yellow Jacket.....	.50

## San Francisco Metal Market.

WHOLESALE.	THURSDAY, May 24, 1888.
ANTIMONY—French Star.	9 @ 91
BORAX—Refined.	— @ 7
Powdered.	7 @ 7
Concentrated.	6 @ 7
COPPER.	
Bolt.	26 @
Sheathing.	26 @
Ingot.	— @ 20
Pine Box Sheets.	— @ 26
IRON—Glenbrook ton.	— @ 30
Eginton, ton.	— @ 30
American Soft, No. 1, ton.	— @ 33
Oregon Pig, ton.	21 @ 30
Olney Lead, white.	— @ 23
Shots, No. 1.	— @ 31
Bar Iron (base price) 7/8 lb.	24 @
LEAD—Pig.	5 @ 52
Sheet.	5 @ 52
Shot, discount 10% on 500 bag	Drop, 8 @
Buck, 3/4 bag.	2 @ 00
Chilled do.	1 @ 20
Steel—English, R.	10 @ 16
Pick and Hammer.	8 @ 10
Machinery.	6 @ 8
Tool Calk.	— @ 5
Tool Calk.	5 @ 50
Charcoal.	6 @ 50
QUICKSILVER—By the flask.	38 @ 00
Flasks, new.	1 @ 00
Flasks, old.	85 @

## DELINQUENT NOTICE.

**Butte Creek Hydraulic Mining Company.**  
Location of principal place of business, 213 Market St., San Francisco, Cal. Location of works, Butte county, California.

NOTICE—There are delinquent, upon the following described stock, on account of Assessment No. 12, levied on the 27th day of March, 1888, the several amounts set opposite the names of the respective Shareholders as follows:

Names.	No. Certificates.	No. Shares.	Amount.
J. D. Dexter, Tr.....	46	100	6 00
J. D. Dexter, Tr.....	48	100	5 00
J. D. Dexter, Tr.....	49	100	5 00
J. D. Dexter, Tr.....	63	500	25 00
Ed. Dexter.....	80	500	\$ 25 00
Chas. Morse.....	92	500	25 00
R. Frank Morse.....	96	500	25 00
Ed. D. Rue, Tr.....	102	2000	145 00
Ed. D. Rue, Tr.....	104	100	5 00



## MINING MEN

And the Public Generally!

AN UNPARALLELED OPPORTUNITY  
FOR INVESTMENT.

S. P. DORSEY, representing over three-fourths of the capital stock of the Maryland Gold Quartz Mining Company, of Grass Valley, which is divided into 500,000 shares, par value, \$20 per share, desires to dispose of a sufficient number of shares to develop this property, the value of which has been thoroughly demonstrated by the continued prosperity of the mine, from its commencement in the Eureka through the Idaho to the Maryland line; the product record of said mines being about \$15,000,000. The wealth of this wonderful and world-renowned ledge is shown by the latest workings in the Idaho to be as finely developed close to the Maryland line as in the richest part of its past course.

Any one investing in this property, can be assured of a continued success equal to its predecessors, viz.: Yielding 25 per cent in dividends per year upon the price at which the stock is offered for sale—viz., \$2 per share. For further particulars inquire of

S. P. DORSEY,  
At the Express Office, Grass Valley, Nevada County, Cal.

## Valuable Mining Property FOR SALE OR LEASE.

The Winthrop Mine, situated at Copper City, Shasta County, together with the fine mill, furnaces, etc., will be sold at a bargain and on easy terms, or will be leased for a term of years to a responsible party. For full particulars, apply to the owners,

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NEWTON COPPER MINE, Amador Co.  
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Twenty years experience, in California, purchasing Ores and dealing in Mines.  
Special attention given to management and sales of mines and purchase and shipment of copper produce

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SEND FOR CIRCULAR. E. P. HEALD, President.  
C. S. HALEY, Secretary.

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The only complete and satisfactory incandescent system. Lights require no attention and are under complete control. Over 500,000 lights in use in the United States. SELF-REGULATING ARC LIGHTS turn night into day and afford a means of working the whole 24 hours; invaluable to contractors and others to whom time is an object. Estimates and designs on application.

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WORKS: First and Stevenson Sts., SAN FRANCISCO, CAL.

MAKERS OF

## CENTRIFUGAL PUMPS FOR IRRIGATION AND RECLAMATION.

TEAM ENGINES AND BOILERS of all kinds,  
MACHINE TOOLS, and full line of  
MACHINE SHOP APPLIANCES carried in stock.

ELEVATORS for freight and passenger use, both worm gear and patent double capacity hydraulic.

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ELECTRIC APPARATUS for the generation and distribution of electricity for LIGHT and POWER. KEITH SYSTEM.

FLOUR MILL ROLLS ground and corrugated. GEAR CUTTING A SPECIALTY.

PRICES ON APPLICATION.

SEND FOR CATALOGUE.

## THE RAND DRILL COMPANY, 23 PARK PLACE, NEW YORK,

Are now so situated with their new works as to offer to the miners of the Pacific Coast small Air Compressing Plants at such prices that almost any small mine can afford to put in power drills if they have none in use.

By their new and patented systems (by which the duty or performance of drills is not reduced with use) it is no longer necessary to buy a Compressor of double capacity than the drills are expected to require, in order to keep up the supply of air necessary on account of the wear of drills and compressor.

Besides having the newest and lightest designed small drill plants, the Rand Drill Company, as is well known, has built, and is now building, the largest Compressor plants in this country, and has patterns for all sizes up to 40-inch diameter of cylinder.

In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

Since the reasons which formerly restrained them from the California market no longer exist, they are now in the field for the business.

SPECIAL ATTENTION is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.

## CALIFORNIA VIGORIT POWDER CO.,

No. 40 California Street, San Francisco,

MANUFACTURERS OF

## NITRO-GLYCERINE

("DYNAMITE" or "GIANT")

## Blasting Powders.

Vigorit "LOW" Powder,  
FOR REMOVING STUMPS AND TREES,  
HAS NO EQUAL.

WORKS: California City, Marin Co., Cal.

ED. G. LUKENS, Manager.

This paper is printed with Ink Manufactured by Charles Eneu Johnson & Co., 500 South 10th St., Philadelphia. Branch Offices—47 Rose St., New York, and 40 La Salle St., Chicago. Agent for the Pacific Coast—Joseph H. Dorsey, 529 Commercial St., S. F.

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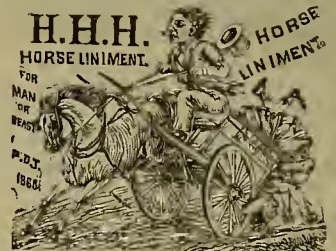
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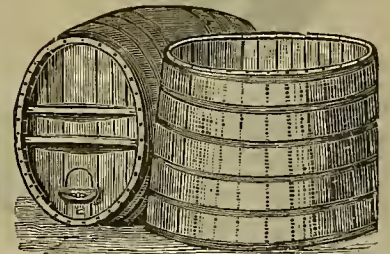
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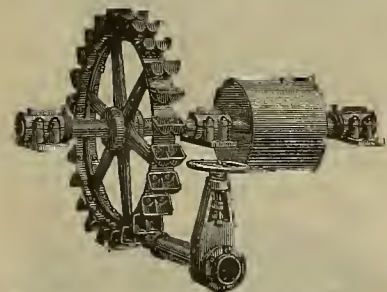
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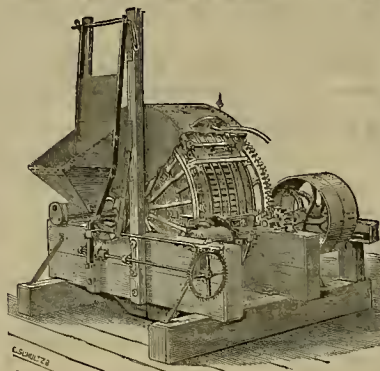
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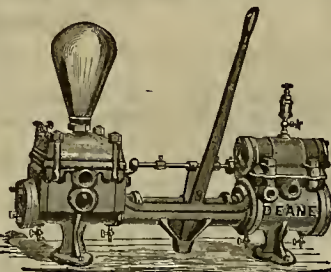
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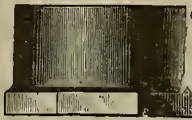
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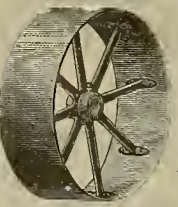
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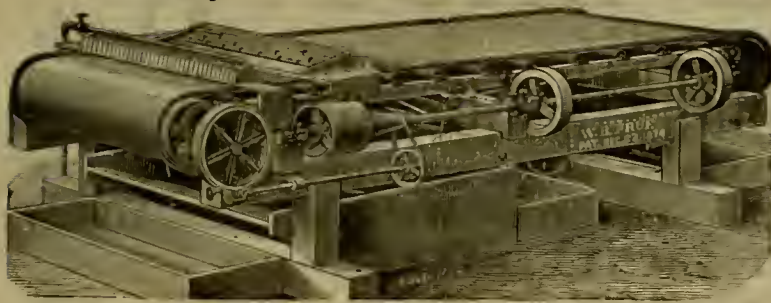
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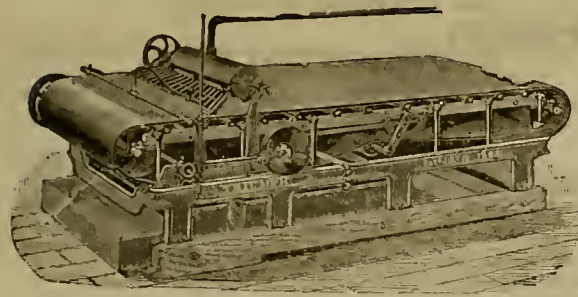
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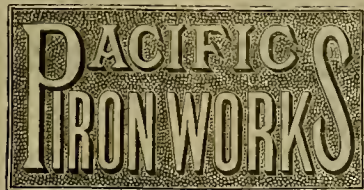
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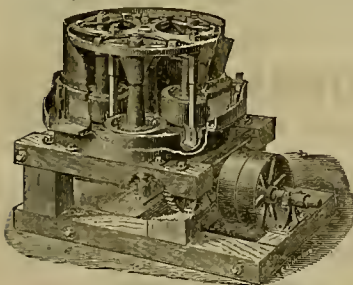
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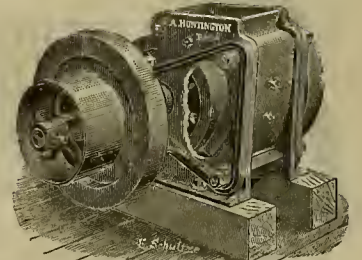
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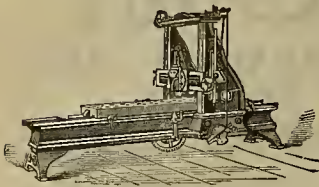
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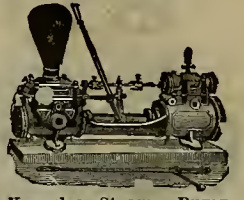


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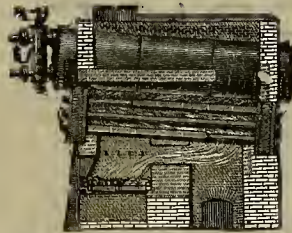
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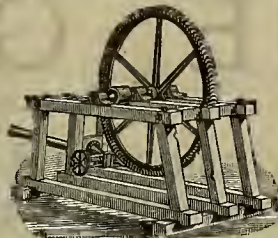
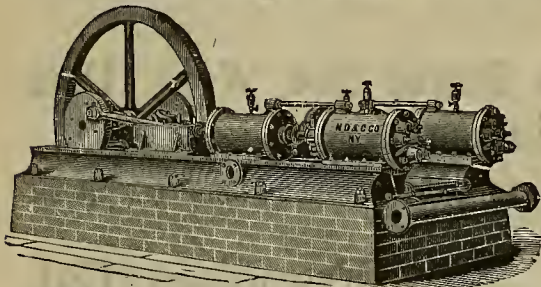
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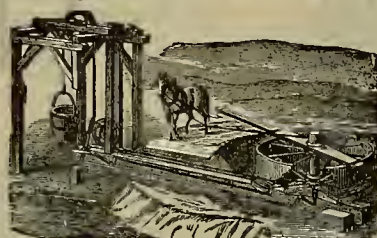
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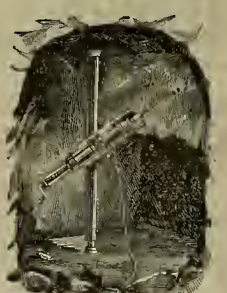


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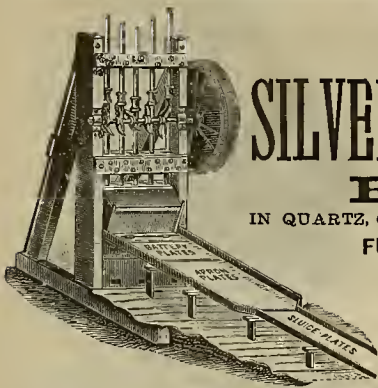


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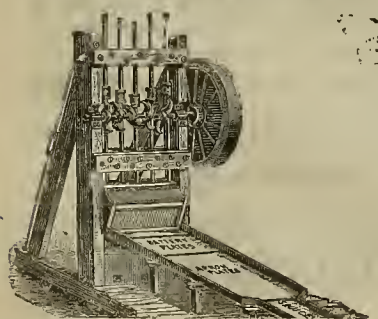
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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

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## Rock-Separating Apparatus for Mining Sluices.

Lawrence A. Fenner of Virginia City, Montana, has patented through the MINING AND SCIENTIFIC PRESS Patent Agency an apparatus to separate the larger rock from the finer material in ground-slucio and hydraulic mining, where want of fall or other conditions make it necessary to keep the heavier material from going into a hed-rock flume. To owners of flat mining ground this invention is a very important one, as it will be found of the greatest utility. It will in this direction have a large field of usefulness.

Mr. Fenner, who was one of the pioneers of Alder Gulch, Montana, has had some 27 years' experience in working flat ground. The usefulness of a practical separator by which rock can be handled rapidly and economically is apparent to every miner who has worked ground where want of fall or other conditions made it necessary to keep the heavier material from going into a hed-rock flume. Where there is want of fall it is made possible to work with a flume having little grade, and where the condition of dump is such as to make it desirable to retain the larger rock, the scoop in this machine can be graded coarsely so as to keep back only such as will interfere with the dump.

In mines where it is necessary to impound tailings this machine may aid in the solution of a difficult problem. Where rapid work is required, two or more separators can be used on a line above the head of the flume. The scoop of the head separator would then have a coarse grating and the ones below would be graded so that the gravel will be given the required fineness before passing into the flume.

The lower half of the 15 miles of Alder gulch, Montana, has but little fall, and only the finest portion of the gravel can be allowed to pass off through the hedrock flumes, which are necessarily of very light grade. Mr. Fenner owns a portion of this flat ground, and has for some years experimented with and perfected appliances to remove the rock. This machine is the result, and a boy with this can do the work of half a dozen men with forks and wheel-harrows, and so effectually that a hedrock flume with a grade of 1 inch to 12 feet carries the tailings with ease that pass the machine. The accompanying engraving shows the apparatus patented by Mr. Fenner.

In the lower portion of the framework of the apparatus is formed a small sluice, one end of which connects with the ground sluice. A horizontal grizzly is placed over the other end of the sluice. A perforated or grated scoop is placed over this sluice and directly behind the

grizzly. This scoop has a frame mounted on a pivotal shaft, by which it may turn through an arc in a vertical plane, making a partial revolution for the purpose of dumping its load. A vertical grating or grizzly is located between the horizontal grizzly and the scoop. This grating is secured to a frame having a pivotal shaft, whereby it may be raised or lowered about the shaft as a center through an arc in a vertical plane.

One end of the motor shaft (run by water-wheel) carries a friction pulley which operates on another placed on a winding-drum, to which is secured a cable, passing over suitable pulleys and connected with the frame of the scoop.

A weight is suspended by cables passing over pulleys, and connects with the frame of the scoop, by which the scoop is turned to a vertical

ing its load. When the scoop comes back to its normal position, the vertical grating is again raised to its position, and the operation continues as before. The weight referred to is so suspended and connected with the scoop that when the scoop is in a normal position the weight acts against it, to assist the main power in dumping it; but when the scoop passes the center the weight acts to bring it back again.

Owners of flat mining ground will be interested by a description of Mr. Fenner's process of working, before the conditions of his ground would admit of a hedrock flume of even small grade. A description he wrote for us about a year since is here reprinted, as, in connection with the engraving, it gives a good idea of the method employed.

"Commencing at my lower line, where there

strong enough to resist the pressure of the overlying wet gravel, which was considerable while ground-slucioing. It was laid to the head of each pit before filling, and the water let into it by a shaft, or monument, which was built up as filling progressed, so as to keep the sand and gravel from entering the tail-race. After stripping in this manner, the machine was moved up on the filled ground, and the remainder of the gravel shoveled into cars and hoisted as before, when the process of filling by ground-slucioing the surface from another pit was repeated.

A 12-foot overshot water-wheel, driven by 80 miners' inches of water, gave the power to hoist the gravel from hedrock, and to carry the washed rock from the machine back on the worked ground; the same water which furnished

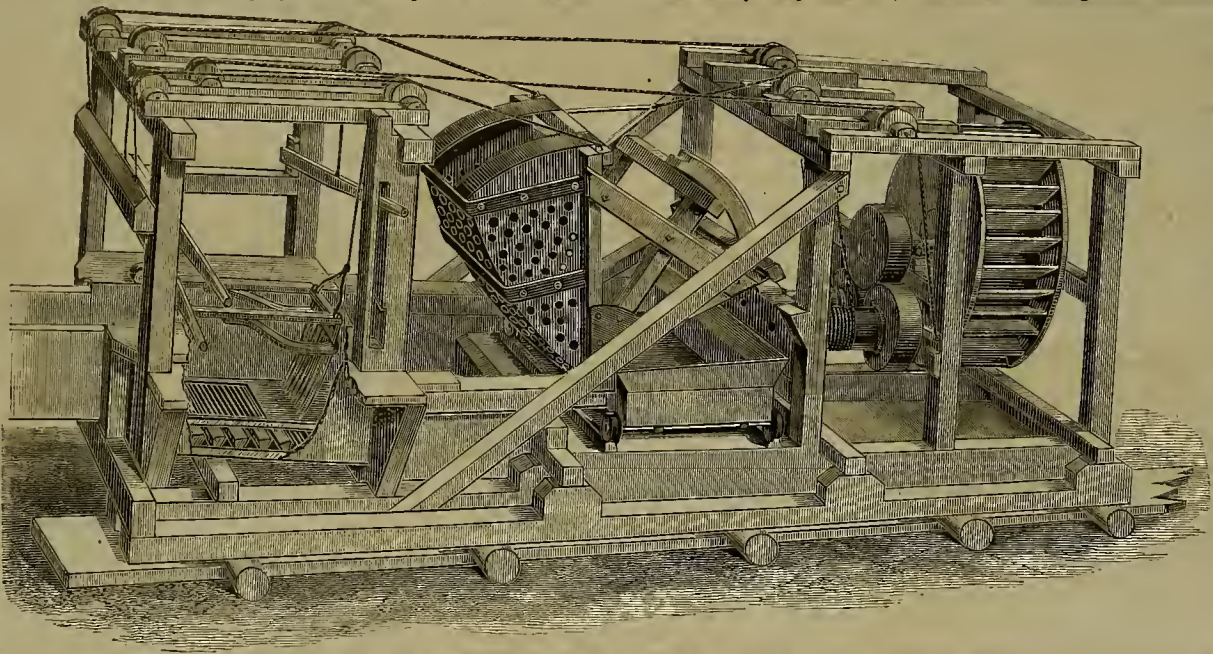
power for hoisting being turned on to the sluices between each carload to wash the gravel. Working by this method for several years, five men (one to tend machine and four to shovel) removed and washed 12,144 cubic yards of gravel each mining season, 185 days being the average season.

Reaching a point on my ground where a flume was practical, my rock-separator was brought into use. This machine is placed near the ground to be mined, and at the head of a 30-inch hedrock flume having a grade of one inch to 12 feet. A moveable flume which can be curved to accommodate the ground-slucio above, and given sufficient grade, carries the

heavy gravel to the machine, where the rock is separated and dumped automatically on either side of the main flume, forming a continuous pile as the works are moved up. My plan of working is to keep the ground-slucio V-shaped, with the point down toward the machine. While ground-slucioing is progressing on one side of the V, hedrock can be cleaned on the other. After ground-slucioing and cleaning hedrock on one side of the V, a low wall is built against the unworked ground, and the top from a diamond-shaped pit, extending from the central line of the gulch to one side, is stripped in the same manner as before described when the sluicing was done at the surface, the continuous pile of rock at the side of the main flume restraining the tailings but allowing the water to pass off comparatively clear. This leaves a little over half of the bank to be ground-slucioed and separated by machine.

There is, without doubt, throughout the Pacific States and Territories, a large amount of ground which might be profitably mined by the use of one of these machines.

It is stated that the Broker Hill mine, New South Wales, where W. H. Patton is manager, will soon build four new 20-stamp mills.



FENNER'S ROCK-SEPARATOR USED IN WORKING FLAT MINING GROUND.

position where, by reason of its center of gravity being on its grated side, it gravitates to and is held in its normal position. A car is run in on a track just back of the scoop and is to receive its load. There is a brake-lever for controlling the movement of the winding-drum.

The operation of the apparatus is as follows: The material is fed through any suitable short flume or sluice, properly graded and arranged, to and upon the horizontal grizzly, through which a portion of the finer material passes into the sluice below. The vertical grating is at this time elevated so that the passage is clear to the main separator or scoop, through which the remainder of the finer material passes into the sluice below, while all the large rocks are retained. As soon as this scoop has a sufficient load the lever is moved, so as to relieve the winding drum of its brake, thereby allowing the operation of the friction gearing and the rotation of the drum which winds up the cable. The scoop is thereby drawn over through a partial revolution so as to discharge its load upon the car.

Before this is done, however, the lever is raised from its rack, whereby the vertical grate is allowed to move down and stop the passage of the large rocks while the scoop is discharg-

ing its load. When the scoop comes back to its normal position, the vertical grating is again raised to its position, and the operation continues as before. The weight referred to is so suspended and connected with the scoop that when the scoop is in a normal position the weight acts against it, to assist the main power in dumping it; but when the scoop passes the center the weight acts to bring it back again. Owners of flat mining ground will be interested by a description of Mr. Fenner's process of working, before the conditions of his ground would admit of a hedrock flume of even small grade. A description he wrote for us about a year since is here reprinted, as, in connection with the engraving, it gives a good idea of the method employed.

After clearing a pit as described, it served for impounding the tailings, which were ground-slucioed nearly half-way to hedrock, from the top of a pit of equal area above. While filling the pit, the water from the ground sluice passed off below through a box tail-race, with only fall sufficient to carry clear water, and which also served as a drain. This box tail-race was made



## Pebble Beach, Pescadero, California.

A Sea Beach on the California Coast Remarkable for Silicious Gems and Mineralogical Curios.

[Written for the Press.]

Officers of the coast survey have characterized the famous Pebble beach of Pescadero as one unique of its kind and without a counterpart on the whole extent of our Atlantic and Pacific coast-lines.

Its distinguishing feature is the mass of highly polished, pure silicious gravel bordering the sea at this locality, in which the topaz, carnelian, onyx, chalcedony, turquoise, agate and Jasper pebbles are found, buffed and perfected by ages of wave action as if by a lapidary.

Wave action has also eliminated all soft and angular minerals from the mass, save occasional fragments of alabone shells and chalcedony, and only the hardest stones survive the surf's eternal attrition.

Many of the topazes and carnelians are of rare clearness and beauty, and may be matched by patient search in size, form and color for jewelry, or for display in mineral cabinets.

Some fine pebbles of milk-and-fire opalescence are found; and the surf-polished crystals of pure, pumice quartz gleam like dewdrops in the multi-colored gravel.

The carnelians are of all tints, from blood-red to the palest pink or purple; and in some rare specimens the color is singularly confined to the middle of the stone, while the exterior is perfectly limpid.

Here, too, are found agates of every color and combination, the choice of which make handsome bracelets, watch-charms and other personal trinkets when cut and set. The smaller gems, however, of clear tint, perfect form and suitable size need no touch of art or lapidary's wheel, but in their natural state, set in contrasted colors, are jewels at once unique and of special interest. Stones of this class are generally small.

But chief among the mineral curiosities of the beach are the so-called "water drops," which are most abundant on a piece of sea-margin north of the main deposit, known locally as "agate beach." These are chalcedony pebbles, more or less translucent, and usually about the size and form of a lemon-drop, having a globule of water imprisoned in a central cavity, and an air bubble which, when small, looks dark by transmitted light and moves within like a living insect.

They are highly prized and much sought after by mineral and curiosity collectors. Mrs. General Dimond of San Francisco is accorded the credit of being first to discover and direct attention to these curios of the beach.

To the non-scientific the stone-imprisoned water is a mystery not less puzzling than the milk in the cocoanut. If it had percolated from without it should be sea-water; on the contrary it is perfectly fresh.

The explanation is that the aqueous drop was enclosed by the silica during the process of crystallization.

These curios, though rare, are not unknown in other parts of the world; and they are occasionally met with in the vugs or cavities of quartz veins during mining operations.

It is evident, however, that only under exceptional conditions of temperature can they exist on the surface of the earth as at Pescadero, since either a temperature below 30° would freeze, or powerful sun rays would expand the water within and fracture the silicious hulks.

On other sea-beaches washed crystals of smoky and limpid quartz occur; such crystals are plentiful at Long Branch, but I found there no other varieties worthy of note, and though many of these are beautifully clear while wet, they lose their limpidity when dry, owing to forcible impact one with another in the strong surf, which, as microscopic inspection shows, covers their surfaces with minute fractures.

At Pescadero, however, the silicious gem materials occurred in extraordinary variety and profusion; the sea floor and beach contour favored accumulation and a gentler attrition, and we have therein the fine lapidary finish of these lustrous stones the ultimate product of patient Nature and the tireless sea toiling through untold lapses of time.

Pebble gatherers are enthusiastic in their pursuit, and return again and again to the charmed precincts of the beach for new varieties, more perfect specimens, or to complete "sets."

And surely no hobby could be more innocent, more full of restful enjoyment and physical good than the gathering of these pleasing and imperishable mementoes in the exhilarant sea air and climate of the Pacific Coast, and in so delightful a locality.

But beyond its distinguishing feature, the Pescadero beach is otherwise interesting and picturesque. The receding tide leaves wide stretches of kelp-covered reefs, where fine sea-mosses and the beautiful alabone univalves may be obtained by the more adventurous visitor. Here, also, are things of interest to geologist and naturalist in the lithology of the shore, the fantastic carving and surf sculpture of the rocks, the pebble-paved pools and basins in the uncovered sea floor, hollowed as if by art, fit haunts for the sea nymphs, or fabled Amphitrite, and natural aquaria rife with varied sea life, lined with mosaic of purple-spined sea-urchins, limpets, and many-tinted sea-anemones.

The hotanist, too, especially one unfamiliar

with the California flora, will find much of special interest in the wildflowers, grasses and shrubs of the immediate coast-line, if he times his visit rightly, say in the period between March 1st and the close of July.

There is for the angler fairly good trouting in the Pescadero river, which rises in the higher Coast Range and courses through the village to the sea.

But better fishing may be enjoyed in several fine trout streams a few miles southward; and in the grand redwood forests east of the village, hunters and summer parties can find unrivaled retreats and camping grounds.

## The Beach and the Pebble Seekers.

A mile in lineal extent north and south will embrace nearly all of the Pescadero beach deposit; and "Bebble beach" proper is but a part of this, a crescent-shaped sweep of sea margin sheltered between rocky promontories and backed by arenaceous bluffs.

Around this crescent, on the seaward slope of clean, surf-washed and sun-warmed gravel, lie the pebble gatherers in all postures of ease, singly and in groups, sorting with unflinching interest the bright-colored mass, and dropping their selections into wide-mouthed hotties, cigar-boxes, or muslin bags made for the purpose.

Here is one who, with the indiscriminate zeal of a neophyte, finds lovely things on every hand, and speedily fills her hottie, her handkerchief, and other improvised receptacles with clear and many-colored stones, gems all, to her untrained eye; but here is another assiduous seeker more advanced in pebble culture, whose critical taste discards all but the perfect in color and form, and whose little vial happily holds all the gleanings of patient hours.

A smoke rises on the beach and a call is heard. This is the welcome signal that lunch is ready; and what an impromptu and enjoyable affair it is truly! Here is gyping under most charming conditions!

A campfire has been built from seadrift, and a tablecloth covers a flat-topped log, upon which cups and plates are arranged; the coffee is hot, and the sandwiches, eggs, cheese, cold meats, cakes, pies, etc., with which the baskets were hountfully filled by our hostess before leaving the hotel, are ready for appetites made keen by the pulse-stirring drive to the beach, the bracing seashore and the stimulus of genial rivalry in a common quest.

Formality is banished, and all the hotel guests, though but chance met to-day, may partake and chat with refreshing unreserve together, after which the various finds are shown and compared; but briefly, as the fortunate are eager to renew the search, and the less lucky are inspired with new hops on seeing the "beauties" found.

## The Town, Routes, Scenery, Etc.

The village of Pescadero (formerly a Spanish fishing settlement, as the name implies) lies out of the beaten tracks of tourists and traffic in a picturesque little valley, through which flows the Pescadero river, a limpid, mountain-trout stream, the ideal "brook" of Tennyson's poetic fancy.

It is nearly midway on the coast between San Francisco and Santa Cruz, and the nearest railway stations are at San Mateo and Redwood, from which points, and also from Santa Cruz, daily stage connections are made.

The best route is from San Francisco by the Southern Pacific railway to San Mateo; thence by stage of a very picturesque section of the Coast Range, passing through Spanishtown (Halfmoon Bay) and the ranches that border the sea, an enjoyable and typical California stage-coach ride of 30 odd miles.

But the outward trip from Pescadero by coach to Santa Cruz is a scenic treat of yet more delightful and varied character, and the traveler is alternately whirled through the foamy beach-surf of the Pacific, under cliffs, and over steep mountain buttresses, through sequestered ranches, hamlets and forest solitudes to California's greatest seaside resort; and from there through the grand redwoods and rugged scenery of the Coast mountains by the serpentine Narrow Gauge railway to Oakland and San Francisco.

The famous beach is two miles from the village, and there are no houses or accommodations for sojourners nearer thereto than the Swanton House.

Parties with camping outfit pitch their tents on the bluffs near the shore; but the hotel guests and villagers, according to ability or inclination, either walk to and from the beach, or go down in staging parties, which are usually made up in the morning soon after breakfast.

Pescadero is not a rendezvous of fashionable folk, nor a watering place in the usual sense; but it is a place of special attraction to anglers, hunters, campers, tourists and a cultured class whose tastes lean not to crowds and display; a favorite resort of many San Franciscans who periodically fly from the city's rout and turmoil for a term of restful change, and a spot of memorable charm to all who find joy with Nature in forest and stream, on mountain and beach, and who love the luxury of "old clothes" and the freedom of an unconventional life.

Good accommodations at reasonable rates are furnished at the Swanton house, a comfortable, unpretentious hotel with a number of detached one-story cottages for families and others desiring to dwell together.

These are bordered in roses and climbing vines, and front a pretty garden whose flowers bloom almost perennially among a profusion of

shrubs, exotics and shade trees that never know the hight of winter frosts.

It was from this umbrageous haunt of birds that on the odoriferous morning air came to my waking ears the ecstatic song of the California linnet from whose mellifluous throat, after a prelude of "chic-chic," poured helter-skelter a marvelous maze of liquid syllables—a carol as sweet and joyous, surely, as ever hushed from bird heart to greet the rising sun. And between these impetuous rhapsodies, blending with the susurris of Woodhine and acacia leaves, came dreamily to the sense the far-away lullaby of sea-murmurs, borne up from the estuary where the surf toils with the out-flowing waters of Butano creek and the Pescadero.

Strangers on this Pacific Coast are often troubled with the Spanish nomenclature there prevalent. The correct pronunciation of some familiar California names can be learned by attention to this rhyme and measure of the following jingle:

A man named Mayo  
Came from Vallejo (-layho)  
To San Mateo  
One summer day.  
Inquiring "Where, O,  
Is Pescadero?  
And what's the fare, O,  
To San Jose?" (Hozay)

MILES J'ANSON.

Woodside, N. J., May 7, 1888.

## Petroleum as Fuel.

A Practical Test Made by the San Francisco Glass Works.

For the past week the San Francisco and Pacific Glass Works has been using crude petroleum for heating purposes, with a view to demonstrating its vastly superior qualities as fuel, from an economic standpoint. A reporter visited the factory, on the corner of Seventh and Townsend streets, and was shown the workings of the new system by Carlton Newman, president of the Glass Co. The oil is pumped from an 1800-gallon storage tank, 275 feet away from the furnace, through a 1½-inch pipe, and is delivered at the burner under a pressure of about 25 pounds. Here it is met by a steam jet with a pressure just sufficient to spray it into the retort chamber. There are now available two burners, but it is found that one will easily keep the 16-foot at a white heat. The spray is not thrown directly against the crucibles, but is first re-generated in a hot air blast, which consumes all volatile gases and particles that may be held in suspension, converting them into a colorless, odorless, permanent gas. Whatever surplusage of oil may be pumped up is conveyed by an overflow-pipe back to the storage tank. All the oil pipes and the tank itself are from two to three feet underground, and the tank is 50 feet from the nearest building. The economic advantages of the petroleum as fuel are many. In the first place, there is not the least trace of smoke or gas anywhere noticeable, even in the furnace, or at the top of the stack. This, consequently, enables a superior article of glass to be made, and renders the work entirely unobjectionable to the neighborhood. The oil, moreover, costs only about \$1.50 per barrel. Four barrels of the oil are equal in heating value to one ton of coal. As the furnace requires about eight tons of coal per day, there is a saving of about \$70 a day. The oil, which comes from the Ventura wells, is about 80° flash test, which, as this test practically proves, is more than sufficient. "And here comes in the injustice of the city ordinance," remarked Mr. Newman. "By it we must use 90 per cent oil, which would cost us so much more as to make the use of oil impracticable."

The company employs about 150 men and boys and has a weekly payroll of \$2000. Thus it is that such manufacturing industries practically benefit the people of this city, the working people, who most need it, and, as Mr. Newman said, "the manufacturers of this coast cannot compete against the Eastern companies who use natural gas, unless an unjust and unwise law is repealed, and unless they may use oil as fuel."—*Alta*.

A HEAVY CARGO.—The ship Commodore T. H. Allen has cleared for New York with the largest cargo ever dispatched there from this port. It includes 5606 gallons of brandy, 269,866 gallons wine, 283,492 pounds wool, 126,768 pounds tin, 3058 gallons vinegar, 19,447 gallons whale oil, 185,603 pounds horax, 20,600 pounds copper cement, 46,436 pounds boiler compound, and 1,406,870 pounds copper ore.

A GOOD RECORD.—Captain Poleman of the steamer Oregon has just completed his two hundred and fiftieth round trip to Portland, Oregon, from San Francisco. During the time he has had command of the Oregon not an accident has occurred. The total distance he traveled, reckoning 1350 miles to the round trip, is 337,500 miles, or a little over 13½ times the distance around the world.

THE following telegram has been received from Supt. Price of the North Belle Isle. Owing to the stoppages at the mill occasionally, the bad condition of the boiler and a shading off in the grade of ore, I would advise the suspension of dividends pending the expense to be incurred in the erection of the concentrating plant and the setting up of a new boiler in the mill.

## The Expression of Our Movements.

## The Tournure.

[Translated for the Press from the French by M. N. M.]

The tournure, says M. Eugene Mouton, is the ensemble of the form, proportions and movements of a person. We look upon it as an expressive action, because it is the movement, that is to say the manner of carrying one's self, which is the preponderant element. With the same forms and the same proportions there may be 10 different tournures, according to the way in which the movements of the body are controlled. That is very well seen at the theater, where the art of changing the tournure is not less essential for a comedian than the change of visages.

The tournure is still more characteristic than the attitude; the latter is composed of a series of movements that a man may execute, whatever the forms and proportions of his body, while the tournure consists at the same time of invariable forms and proportions and of free movements. It conforms, then, more strictly to individual physiognomy and by evidences so manifold and striking that, when the tournure of a person is merely seen from behind, we can imagine the features of the face. It is an experiment easy to make on the street, and, though it sometimes fails, it very often succeeds.

Whatever may be the connection between the countenance and the tournure, it is recognized at the first glance of the eye when we observe a figure in its ensemble. The same characteristics, the same signs, express in the tournure what they express in the face. In greatness, in littleness, in height and in breadth, in the rectitude or curvature of lines and surfaces, in the more or less of order and proportion of parts and masses, analogous effects correspond to those which the same modifications produce in the characteristics of the other.

A tall stature, a small and well poised head, shoulders distinctly shaped, narrow hips, and long limbs constitute an elegant tournure.

## But it is a Condition

That the bearing may be firm and flexible, and that the movements may be just and harmonious. If the head be stooped, the shoulders and arms drooped, the back curved, the legs bent, and the feet dragged along, you will have a tournure as ungraceful and as pitiable as possible.

It has been often remarked that it is much easier for a thin man than for a fat one to have the *air distingue*. That is true on account of the physical distinction which results from the proportion of the parts of the body. But if the nature of things interdicts to fat men that kind of distinction, their corpulence, the amplex of their stature, and of their characteristics give another more imposing sort of distinction called "*un grand air*."

It must be understood, however, that a tall stature is the condition almost indispensable to such an advantage. A short man, stout, stuffy, obese, cannot have an elegant tournure, because his limbs, obstructed by fat, are able to execute only slow, heavy and contracted movements. Pretense and modesty, energy and feehleness, all the shades of character, all professional signs, have in the tournure expressiveness precise enough, and in general, sufficiently recognized to be readily translated in ordinary language; so that "tournure" may be used indifferently for "figure" or "physiognomy," as when we say, for example: a tournure of a knave, of a foolish person, of a conqueror, etc., it is the same as saying, a modest, ridiculous, martial, awkward or gracious tournure. In short, as we see, the tournure is at the same time a natural and an acquired disposition; it brings then to the whole "physiognomy" a double distinction, and, furthermore, it pervades all parts of the figure, which still adds to its importance.

When we analyze attentively the elements of what we call the "air" of a person, it is but an equivalent of language in order to express sometimes the tournure, and at other times the attitude, because all that has been said of these last two expressive actions might be said of the "air." This word then becomes a part of the physiognomical vocabulary, and is oftener employed than "tournure" and "attitude." In it would be found, perhaps, more precisely that shade employed to qualify an action rather than to characterize a person.

## The Walk and the Gait.

The walk is progression by the displacement or change of the center of gravity. It is done in moving forward, backward and sideways; is slow or rapid, continuous or by jerks, straight or irregular, in its direction. The run has less of effort and by exceptional labor is performed only in going forward.

It is not the difference in rapidity that makes the distinction between the walk and the run. It is the difference of attitude; for a rapid walk may equal a slow run. In walking the body remains straight, and the center of gravity continues nearly perpendicular to the line traced upon the ground from one foot to the other. In running, on the contrary, the body inclines, the arms project forward, each of the legs is in turn thrown backward, the whole figure tends to place itself as near as possible to the horizontal, and that in proportion to the rapidity of the running. It follows that the center of gravity is, in running, diverted much more from the perpendicular. Under these conditions running may be considered as a continual fall, but



a fall in which, in holding up the body, the legs transform into horizontal movement, the vertical movement impressed on the body by heaviness. Heaviness then, produces a considerable difference in the speed of running, and therefore by instinct a person bends forward in running. This position helps, moreover, the walk also, which becomes easier and more rapid as we lean forward. But that which makes still better the distinction, is that in running there is between one step and that which follows, an instant in which the two feet are at the same time in the air, while in walking, one foot is raised only at the instant in which the other foot is placed.

#### The Walk, Above All

When it is a little rapid, is always accompanied by a balancing alternately of the two arms, the left arm advancing when the right leg moves forward and the right arm when the left leg does the same. This balancing has for object and for result to throw forward the weight of the arms and to aid in displacing the center of gravity. At the same time the loins execute alternative movements of torsion, or twisting to right and left, accompanying the movement of the leg forward. Finally, the swinging of the arms impels a swinging more or less marked of the shoulders. Such is the analysis of walking and running. Although these two species of movements may be ordinarily only a dynamic action, they constitute a function of relation, and by the varied manner with which they are accomplished, they become in many cases as expressive as the gesture and the attitude.

At each of their variations there are corresponding expressions, always governed by the general principles of physiognomy. That is so true that language not only qualifies diversely the walk, but we govern it in the sense of the expression desired. A dignified, graceful walk is a trait that every one remarks and that every one on occasion will not fail to affect, just as one will laugh at a walk which is ridiculous or ungraceful.

(To be Continued)

#### Inyo's Death Valley.

Death Valley is a noted section. It is noted over the world. Such a barren waste exists nowhere else on this continent. It has been known for many years that gold and silver mines exist along the borders of this wonderful desert, which are of astonishing wealth. Hundreds of hardy prospectors have braved the dangers of the plains, but never have been able to make any great progress on account of the difficulty experienced in transporting machinery into the country. It is expected that relief will be obtained at no distant day by the advent of the Carson narrow-gauge road which is now headed for San Bernardino, and which will cross this great desert. Peter T. Cochran, a resident of this city, has just returned from a perilous journey to and from the valuable mines which are located in Inyo county. Mr. Cochran says that about two months ago a party of six miners, headed by S. M. Sterling, of Colton, started for the Inyo country for the purpose of prospecting. This they did for about a month, when they were compelled to return on account of the provision supply running out. Even the Indians were out of food, and there was great rustling on their part for the actual necessities of sustenance. They made some very good discoveries and saw some mines which were paying tolerably well. The "diggings" in this section, at least many of them, were very old, are very good, though but few are working. In some portions there are immense gold and silver ledges, the surface cropping being wonderful. The country rock is porphyry and slate, and many fine specimens were brought back by the party. Mr. Sterling has gone East to obtain the necessary capital for further pushing his discoveries. It is his intention to put in a 10-stamp mill on the Inyo mine. This mine has a four-foot vein, which is growing wider as depth is attained. It can be traced for miles. The mountains around Inyo are full of mines, and the owners are waiting patiently for some means whereby they can obtain machinery and supplies at reasonable rates. At the above place there is no lack of water and the sides of the mountains are covered with the very best of timber for use in mines. As the properties are situated but about 200 miles from San Bernardino, they will, should the Carson road be built, be of great importance to this city, as they will, in a great measure, assist in the booming of our city. It is the intention of the party above referred to to visit the place again during the summer and further their interests.—*San Bernardino Index.*

**MINING AND METALS.**—Mr. Richard P. Rothwell, the editor of the *Engineering and Mining Journal*, has been invited by the Hon. Carl Schurz, president of the United States Almanac Publishing Company, to write the essay on mining and metals for that publication, which is to be a comprehensive presentation of American products, industries and commerce. From 20,000 to 30,000 copies will be distributed all over the world by the consular office of the United States under instructions of the Department of State.

The Boca Mill and Ice Co. are enlarging their dam so as to have the ice pond cover nearly one square mile. The improvements will cost \$40,000.

#### Forest Hill Drift Mines.

##### Back Channels.

We take from the letter of a correspondent of the *Placer Republican* the following statements:

During my first visit we were impressed with the fact that although the mines were yielding immensely, every individual miner was working for the great hope that was ahead of him, namely, the back channel. At that time the Jenny Lind, the Jersey and the Independent were running hedrock tunnels for the back channel. They had got back on hedrock, some of them, over 2000 feet, but were still in rock. You ask, "Where did the money come from, then?" That, they claimed, was a "lucky hit." They had raised up through the rock and, finding a very rich stratum of soft, red gravel, they were working this out by the drift process. How "lucky" this find was the record of that district shows. By referring to the records at the San Francisco mint, it is found that the Jenny Lind took out over a million dollars, the Jersey a million and a half and so on all down the list. Coming back here to-day, I find those tunnels still in hedrock, not a single mine on the front of the divide having gone back far enough to get to that lead.

The Jenny Lind Company got into trouble and sold out to the adjoining claim-owners. The New Jersey claim prosecuted its work on the hedrock until the rock pitched so that they found their tunnel too high to work the lead if they reached it. The Independent, finding its tunnel too high, went back to the canyon and sunk a shaft and actually found the back channel, and, after working it enough to prove its richness, were driven out by a flow of water they could not manage. So time went on, and the front ground being nearly worked out, but little development was made at the hill or on the divide until Mr. Chappellet began sinking a shaft on the May Flower mine. To the uninitiated it is a mystery how these miners know the back channel is there, but they do as the fact develops. Mr. Chappellet sank a number of shafts under difficulties and discouragements that would have overcome most men, and finally struck the channel. It is an open secret how he took out gold enough in a very short time to pay all his expenses—the expenses of several years of dead work through shafts, contending with water and bad air and other things too numerous to mention. However, he found the back lead, and to Mr. Chappellet is due the credit of proving the truth of the miners' conviction of its existence ever since they began to mine in the district. Mr. Chappellet, after locating the lead, has since run a tunnel of over a mile in length to the lead at great expense, and has now a mine worth—well, \$800,000 is the price that a French syndicate has paid for it, I am told. This development made by Mr. Chappellet in the May Flower has no doubt given a new impetus to the working of the mines in the district, but the miners at the Hill have all along been diving away in one place and another, the Dardanelles being worked as a hydraulic claim until the debris decision put a stop to that. It then became the property of General Jo Hamilton of your town. Many were the surmises and figures of speech indulged in by the old miners as to how "long-headed Jo would run a mine." They have just found out. He went to the divide and stayed there until he "formulated a theory" as to how that mine was to be worked, and our visit to the divide at this time was to visit the mine and find out for ourselves how and where he struck it.

Well, we found out that after spending considerable money on hedrock tunnels and raising up shafts and prospecting around generally, he placed Henry May (who was a principal owner in the Jenny Lind in early days) in full charge underground with orders to work where he pleased till he found it. Of course, being an old miner at the hill, he knew it was there. They all do, but Mr. May, in this case, proved his case. He worked for several months, going into the hill a distance of about 2200 feet, I am told, and then struck the blue lead; and a rich lead, as it proves to be. They have a breast of 75 feet wide in blue gravel that by a very crude way of working averages \$9 to the carload. Having developed it far enough to warrant its permanency, General Hamilton has erected a 10-stamp mill, only putting in five stamps at first, that will start up in a few days. We were taken into the mine and spent some time prospecting for ourselves, finding gold all over the face of the drift. The miners were not at work, as they have filled up all the bins and places to hold the gravel, and are now waiting for the mill to crush it. One of the men, well used to the sight of gold, told me that in the 390 loads in the bin was money enough to repay the whole expense of mill and improvements. To test this, we pounded up in a mortar a piece about eight pounds in weight, and got over \$5, in grain about the size of rice. The question is, has Hamilton struck the back channel? When first struck the lead or channel appeared to run across the divide. The back channel runs up and down the divide, but as the lead is further developed it is making up the divide, to the satisfaction of those who say it is an outlet of the back channel. Whatever it is, it is like the Mayflower lead in color and general characteristics, and has every appearance of being as rich and extensive. After the mill is working I will let you know the result as near as I can learn.

I have made no mention of the Paragon mine,

otherwise the Breese and Wheeler. To tell the truth, that mine speaks for itself, turning out more gold, I believe, than any other gravel mine in the State. The present working of the mill is upon a very rich lead of gravel. No one questions whether it be on the back channel or not, for it is a belief among miners at the hill that the Paragon can not miss it. It always pays enormously. The claim, it is said, has never had to be prospected for pay. They get it all the time.

#### American Locomotives.

The key to the evolution of the American railway is the contempt for authority displayed by our engineers, and the untrammelled way in which they invented and applied whatever they thought would answer the best purpose, regardless of precedent. When we began to build our railways, in 1831, we followed English patterns for a short time. Our engineers soon saw that unless vital changes were made our money would not hold out, and our railway system would be very short. Necessity truly became the mother of invention.

The first and most far-reaching invention was that of the swivelling truck, which, placed under the front end of an engine, enables it to run around curves of almost any radius. This enabled us to build much less expensive lines than those of England, for we could now curve around and avoid hills and other obstacles at will.

The next improvement was the invention of the equalizing beams or levers, by which the weight of the engine is always borne by three out of four or more driving-wheels. They act like a three-legged stool, which can always be set level on any irregular spot. The original imported English locomotives could not be kept on the rail of rough tracks. The same experience obtained in Canada when the Grand Trunk railway was opened, in 1854-55. The locomotives of English pattern constantly ran off the track; those of American pattern hardly ever did so. Finally all their locomotives were changed by having swivelling trucks put under their forward ends, and no more trouble occurred. The equalizing levers were first used by Rogers in 1844.

These two improvements, which are absolutely essential to the success of railways in new countries, and have been adopted in Canada, Australia, Mexico and South America, to the exclusion of English patterns, are also of great value on the smoothest and best possible tracks. The flexibility of the American machine increases its adhesion and enables it to draw greater loads than its English rival. The same flexibility equalizes its pressure on the track, prevents shocks and slows, and enables it to keep out of the hospital and run more miles in a year than an English locomotive.—*From "The Building of a Railway," by Thomas Curtis Clarke, in Scribner's Magazine for June.*

**A POCKET MINE.**—The Bonanza mine has been doing well again. We learn from high authority that since our last interview, two weeks ago, that a considerable quantity of gold has been taken out, making altogether about \$50,000. The rock furnishing this last gold was highly sulphureted with copper and iron sulphurets, besides being attended with arsenical pyrites. The material was run through Mr. Ferguson's mill first and as much gold as possible, then the residue, or sand, was subjected to Mr. Louis Blanding's metallurgical process. It appears that the crossing, the contact of which with the lead makes the gold, has divided and gold was found on both divisions of it. The parties are not sinking at present, but are steadily, intelligently and systematically following the branches of the crossing upward. Ultimately their operations may extend eastward a few feet from the present workings. Never before in this county has ground been so thoroughly studied, has the elates, the changes, the matrix and the sulphurets been subjected to so close an examination, and their influences so clearly interpreted, as in the present instance. This mine has had its history read a dozen times or more, and oftentimes has prediction and speculation announced that the "bottom has dropped out." But it has lived through it all, and at intervals when mining opinion was against it has arisen like a thing conscious of its power and its duty unto its owners.—*Tuolumne Independent.*

The miners of the Bulwer and Standard mines, Bodie, have had a row over some mining trouble of the respective companies. A bulkhead on the 200 level was blown up and some pistol shooting indulged in. No one was hurt. The Miners' Union of the town called a meeting, sent for the superintendents of both mines, and informed them that there must be no more shooting, blowing up of bulkheads, or any other business of that kind, endangering the lives of miners; that they must settle their differences in the courts.

**A NEW AND POSSIBLY USEFUL ALLOY.**—A correspondent of *The English Mechanic* gives the following recipe for a curious alloy: "Put into a clean crucible an ounce of copper and an ounce of antimony; fuse them by a strong heat and pour the alloy into a mold. The compound will be very hard and of a beautiful violet hue. This alloy has not yet been applied to any useful purposes, but its excellent qualities, independent of its color, entitle it to consideration."

#### The Borax Mining Companies.

Owing to the assignment of the house of Wm. T. Coleman & Co., the borax companies which he controlled were also compelled to assigned. Detailed statements of the assets and liabilities of these companies have been filed with the County Recorder.

The summary of the financial condition of the three companies is creditable, in that the assets of each far exceed the liabilities. The combined assets of the three corporations aggregate \$1,598,543.70, while the combined liabilities amount to only \$547,316.17, or a little more than one-third the value of the assets. The excess of the combined assets over the combined liabilities is \$1,051,227.53.

The following detailed statements show in brief form the condition of each company and the items comprising their debits and credits:

##### The Harmony Borax Company.

The statement filed by the Harmony Borax Co. shows the financial status of that corporation to be as follows:

**Assets**—Mining property known as the Wintere Borate Deposit Placer Mining Claim in Death Valley Borax and Salt Mining District in Inyo county, \$75,000; Desert Borate Deposit mine, \$100,000; ranch of 640 acres, \$10,000. Borate mines—Ancient Lake, \$10,000; North Columbia, \$125,000; Mushroom, \$600; Neel Consolidated, \$140,000; Stevens, \$10,250; Borax Extension, \$250; Centennial, \$250; improvements and personal property connected with the Coleman Borate Deposit Plant in Inyo county, \$40,298.18; improvements, etc., on the Calico Borate Deposit Plant in San Bernardino county, \$4936.73; property of teaming department in Kern county, \$32,572.17; property in Alameda county, \$2607.24; borax pledged to Wm. T. Coleman & Co. by delivery of warehouse receipts to secure balance of account for advances, \$80,050.59; borax consigned to W. T. Coleman & Co., but not accounted for up to May 8th, \$27,778.55; claim against Borax Board, San Francisco, \$10,000; borax on route from mines and refinery and at Alameda Point, \$30,362.65; boracic acid, etc., \$21,317.50; cash in Bank of California, \$2379.75; claim against W. T. Coleman, \$5298.20; claim against Meridian Borax Co., \$1092.65; merchandise en route to New York, \$1850.28; office safe, \$300; total assets, certain and contingent, \$732,170.49.

**Liabilities**—Forty-nine drafts, drawn by the Harmony Borax Co. upon Wm. T. Coleman & Co. from January 4, 1888, to March 17, 1888, (liability on the same being wholly contingent upon said drafts having been negotiated), \$172,550; balance of account in excess of foregoing drafts, \$14,660.98; sundry creditors for labor, etc., \$4836.05; California Chemical Co., \$6928.06; Harmony Mining Co. (in San Francisco), \$3011.64; Henry Clay Mining Co., \$11,686.79; total liabilities, \$213,973.52.

**Recapitulation**—Assets, \$732,170.49; liabilities, \$213,973.52; excess of assets over liabilities, \$518,196.97.

##### The Meridian Borax Company.

A summary of the financial affairs of the Meridian Borax Company is embraced in the following statement:

**Assets**—Mining property of the Meridian Borate Deposit Placer Mining Co. in Inyo county, \$150,050; South Meridian borate mine, \$200,000; Lowland borate mine, \$100,000; Played Out borate mine, \$1000; White Monster borate mine, \$2500; Hard Scramble borate mine, \$500; Lizzie V. Oakley borate mine, \$3000; Widow borate mine, \$2500; Flag End borate mine, \$2500; East Coleman borate mine, \$20,000; Lila C. borate mine, \$10,000; Biddy McCarthy borate mine, \$2500; Grand View borate mine, \$5000; Mammoth Queen borate mine, \$3000; contingent claims against W. T. Coleman & Co., depending upon the fact by whom payment of certain drafts drawn upon W. T. Coleman & Co. and accepted by them is made, \$155,232.03. Total assets, certain and contingent, \$657,832.03.

**Liabilities**—Forty-seven drafts drawn by the Meridian Borax Co. upon Wm. T. Coleman & Co. from Jan. 4, 1888, to April 20, 1889; liability on the same being wholly contingent upon said drafts having been negotiated, \$170,750; due Harmony Borax Co., \$1092.65. Total liabilities, \$171,842.65.

**Recapitulation**—Assets, \$657,832.03; liabilities, \$171,842.65. Excess of assets over liabilities, \$485,989.38.

##### The California Chemical Company.

A tabulated statement of the assets and liabilities of the California Chemical Co. is as follows:

**Assets**—Real estate and buildings, \$25,000; mill, fixtures, and machinery, \$19,358.18; due from Harmony Borax Co., \$6928.06; contingent claims against Wm. T. Coleman & Co., depending upon the fact by whom payment of certain drafts drawn upon W. T. Coleman & Co., and accepted by them, is made, \$157,254.94. Total assets, certain and contingent, \$208,541.18.

**Liabilities**—Forty-nine drafts drawn by the California Chemical Company upon Wm. T. Coleman & Co. from Jan. 12, 1888, to May 6, 1888, liability on the same being wholly contingent upon said drafts having been negotiated, \$161,500.

**Recapitulation**—Assets, \$208,541.18; liabilities, \$161,500. Excess of assets over liabilities, \$47,041.18.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Ocalaveras.

**THE CALIFORNIA MINE.**—*Chronicle*, May 26: Work is progressing favorably at the California mine, situated about three miles north of railroad, and owned by Messrs. Lamphear & Putnam. The tunnel is now in a distance of 100 feet, which taps the ledge at a depth of 80 feet from the surface. The vein at that depth shows one foot in width and carries free gold and sulphurets. The owners have recently put up an arastra for the purpose of prospecting the vein thoroughly.

#### El Dorado.

**SATURDAY MINE.**—*Placeriver Observer*, May 22: The Saturday mine near Nashville, in this county, has been opened by shaft and cuts, showing the ledge to be 151 feet wide from wall to wall apparently well defined. The grade of ore the whole width of the vein has not been determined, but if it should be even low grade, with the facilities for working, it can be made a very profitable mine. Free gold is visible in the openings across the vein. The outlook for this mine is certainly promising.

**SLATE.**—It is reported that the California Slate Co. are preparing to ship a large quantity of slate to Oakland and San Francisco. This slate is of a quality equal, if not superior, to anything of the kind found in the United States, and its production will prove to be an industry of great importance to this county.

#### Inyo.

**DEEP SPRING.**—*Inyo Register*, May 24: The mining outlook in the Deep Spring region, across the Inyos, is looking up considerably. The Cliff mine, owned and worked by Greenly & Broder, is well opened by three or four tunnels, all on the ledge from 100 to 200 feet, with a fine showing of high-grade ore ready for stoping in every one. Two tons or more of ore, ready sacked on the dump for shipment, will go about \$1000 per ton. Turner and partner have a mine near by from which they will soon make a small shipment of similar high-grade ore. Payson & Bro., at the lower end of the valley, have out a carload or more of silver-lead ore ready for shipment. At Palmetto, further east, a new silver mill is in the course of erection, while active work is being carried on on quite a number of mines in the vicinity—gold, silver, and silver-lead, the former for Murphy's steam arastras, for which the prospects are said to be very good indeed, as will be those of that entire section when the new mill gets under steam, which will be the case in about two months.

#### Monterey.

**LOS BURROS MINES.**—*Salinas Index*, May 26: The Cruikshank mine continues yielding rich ore. The lower tunnel intended to drain the mine is now in about 80 feet. Other claims are prospecting well. Goods are packed into the mines from Jolon at prices ranging from 1½ to 2 cents per pound. The cost of going from Salinas City to the mines is as follows: By rail to Kings City, \$1.45; by stage from Kings City to Jolon, \$2; supper, bed and breakfast at Jolon, \$1.50; thence by horseback to the mines, \$3; total, \$7.95.

#### Nevada.

**THE CENTENNIAL DRIFT MINE.**—*Nevada Transcript*, May 25: Supt. Henry Richards of the Centennial drift mine between this city and Washington was in town night before last. Prospecting operations at this mine are going along nicely. All of the water having been pumped out from the 400-foot shaft, the work of extending the drift, which is now in 500 feet directly south from the shaft, was resumed last Monday. This drift is under the bedrock to which upraises are made every 100 feet. The bedrock is pitching and the last upraise made reached it within a much less distance than the preceding one. Supt. Richards does not have much to say, as he is too old and good a miner to say there is gold in a given place till he has dug into that place, but his manner indicates that he expects to have some news about the Centennial before many weeks have elapsed. The Centennial Co. has been searching for that channel about 14 years, and the hunting has cost them not less than \$125,000 in hard cash.

**QUARTZ.**—*North San Juan Times*, May 19: The quartz mine of D. R. McKillican & Co., situated 11 miles northeast of this place, is being steadily and energetically worked under the superintendence of the first-named gentleman. The ledge is of the "pocket" class and yields well when its pockets are tapped—more than can be said of some pockets of another class that we wot of. The company has been driving a tunnel for the purpose of striking the ledge at an unexplored point, and Sunday morning last the ledge was encountered in the face of the tunnel. Although, generally speaking, only the pocket portions of this lode will warrant milling, Mr. McKillican thinks, if further work develops a continuance of present indications, every pound of rock between the ledge's walls will pay to put through the mill. The hoisting works, mill, etc., in connection with this mine are first-class in every respect, and will not suffer by comparison with the mining plants of more pretentious companies than the one herein referred to. The enterprise of this company in the face of difficulties seemingly insurmountable is worthy of emulation by other quartz men in this county.

**THE PROVIDENCE.**—*Nevada Transcript*, May 23: It will be gratifying news to the community to learn that the Providence Mining Co., of this city will soon again be in full operation. The force of employees is being gradually increased, and by the end of this month the mine will have resumed its old-time activity. A dry house is being built and other improvements about the property are being made preparatory to the resumption of operations. The Providence has for many years been the leading mine of this district, and good judges say it will continue to be so for many years to come.

**WASHINGTON DISTRICT.**—*Foothill Tidings*, May 23: From J. G. Fredenburr, the well-known prospector of Washington district, who was in this city to-day on business, we learn that the mining section from which the gentleman hails has to-day better prospects than ever before. Several good mines are

being developed, and prospectors may be met with on all hands. Thirty men are employed at the Washington mine and the output is considerable. Day and night the 20-stamp mill is steadily engaged. As depth is attained, the ledge improves in quantity and quality, a characteristic of the quartz veins of the district. Across the Yuba is the Blue Bell, owned by Tregidgo & Von Schroeder, who, by the way, also own the Washington mine. Fifteen or eighteen men are employed here, and the ore is high grade. The capacity of the ten-stamp mill is to be doubled, and new rock-breakers and other improvements are to be made. Some 30 men are in the employ of the Yuba Co., a property not unknown to Grass Valleyans as experiencing numerous ups and downs. The shaft on the Yuba is now 800 feet in depth and the lowest level on the vein is in 300 feet. At the shaft the level shows a four-foot ledge of very good ore, and at the face of the level the ledge is seven feet thick and the ore is of even better quality. The mine is yielding good profits, and the outlook justifies the erection of a more powerful air-compressor for operating the pump and driving drills—an improvement which has been decided upon. A mile and a half south of the Yuba, at a higher altitude, this same company is again prospecting the Last Chance claim, owned by it. Here the indications are considered favorable. Three or four years ago more or less development work was done on the Last Chance. A promising claim is the Daylight, situated on Haldenson Flat. A Mr. Haldenson and three others are the owners and are pushing prospect work. When work was first started there was only a very small but rich stringer in sight; now a three-foot ledge of good ore is being worked and a five-stamp prospect mill has been constructed in a convenient situation. The Croesus is owned by Mr. Fredenburr, C. W. Kitts and others. Former development work consisted wholly of a 180-foot tunnel which tapped the vein at too high a point and consequently proved of no practical use. Mr. Fredenburr is now personally conducting operations. He has caused a shaft to be put down in the tunnel and the ledge proper to be uncovered. It is of good size, and the quality warrants developments upon a larger scale and the construction of works. Although paying dividends, the Spanish mine is not yielding so profitably as was the case a few months ago. This is accounted for by the fact that the management extracts and crushes all the ore—does not grade it. It is here that ore is extracted and reduced at an average cost of 60 cents a ton. Nothing is being done at the Eagle Bird—perhaps the richest mine in the district. When shut down because of the financial difficulties of the owner, Shattuck of San Francisco, the output was very high. Litigation for the possession of the property is still in progress.

**GRANTVILLE BELT.**—*Nevada Herald*, May 28: The numerous shipments of machinery to the Rocky Glen mine show that the owners mean business. Since the mine was bonded last year, development work has been going on steadily and the result has proven satisfactory, or more machinery for a larger plant would not be ordered. The success of this mine has given a new impetus to that whole section. The success of the California mine has also done much to increase confidence. These two mines are, without doubt, very promising properties. Between the two—and in fact on both sides of them—north and south, there are numerous quartz mines that have been worked and some of them showed as well as either of the two. The rock in the Eureka district is high grade. Several of the ledges have paid about \$40 per ton, and the average is considerably above \$5. Water is abundant in that section and many of the claims are so situated that it can be utilized for power. There is a great field there for the prospector and the capitalist, who wants to develop mining property.

#### San Diego.

**JULIAN DISTRICT.**—*Julian Sentinel*, May 19: The recent rush to the alleged gold fields in Lower California is "busted." Capitalists and prospectors are now turning their attention to the rich strikes being made almost daily in the Julian district. Every stage and private conveyance that comes in brings with it prospectors, who all come prepared to stay. A rich lead was found this week about six miles from Julian, full particulars of which we will publish next week.

**GOLD AT CARLSBAD.**—*National City Record*: There is much excitement at Carlsbad over the opening of an old mine that was abandoned 20 years ago by Capt. Louis Rose of San Diego. An old Colorado miner came across the mine recently and relocated it with Mr. F. D. Mitchell. They now have 2000 tons of ore on the dump, running well in silver, copper and gold. The mine was abandoned because it cost too much to transport the ore. Now that railroads run so near the property it is claimed that the ore can be handled at a profit. Hundreds of people are flocking to the place and the whole adjacent country is being staked out.

**GOLD KING.**—*Julian Sentinel*, May 26: The new gold find, is located on the land owned by Messrs. Fish & Thousstrup. We found Messrs. R. G. Melrose and F. E. Feeler hard at work—digging out the quartz and the other testing it in a mortar. The rock they are now taking out averages \$300 to the ton. Two shafts are being put down, and it is probable that hoisting and reduction works will soon be built. We were shown a piece of rock about the size of a man's hand that contained in the neighborhood of \$30 in gold.

**STONEWALL MINE.**—*Julian Sentinel*, May 26: The shaft from which ore is now being taken is 230 feet deep. About 60 men are employed around the works, and work goes on day and night and Sunday, month in and month out.

#### Sierra.

**WALLIS CONSOLIDATED.**—*Sierra Tribune*, May 26: Arrangements are being made, whereby work upon the Wallis Consolidated Co.'s ground will be inaugurated. The company has been reorganized, and under the new deal there is no doubt that the 1420 acres of valuable ground lying along the Henness Pass ridge will be thoroughly prospected. The first move of the company will be to run a tunnel into the ridge at a point just above the old Ironides quartz mine. The ridge is narrow there and the expense of getting into it will be quite light.

**PROSPECTING.**—John Casserly, Hugh Murray and Henry Johnson are prospecting what they have named the Bamboozle gravel claim. It adjoins the Wide Awake Co.'s ground. The boys propose to

push ahead the work of opening up their claim and are confident of striking something good.

**THE SAN LOUIS MINE.**—Ed. Lawrence, Martin Carroll and Joseph Mondozi on Saturday last paid a visit to the San Louis mine. No. 3 tunnel is now in 285 feet, the last contractors having completed 96 feet of the same.

**GOLD.**—*Mountain Messenger*, May 26: To show how the gold is scattered in these mountains we mention an incident: Last Sunday morning, while Mr. and Mrs. Hardy were weeding in their garden, about a mile above town, when near the porch of the house, Mrs. Hardy picked up a piece of pure gold, which weighed \$55. The ground on which the garden is made, the natural formation, was worked out years ago, the rocks being leveled off and soil filled in to make the garden.

**WALLIS CON.**—Work will be begun on the Wallis Consolidated claim at an early day, by opening an old tunnel run into the ridge many years ago.

#### Shaeta.

**WATER-POWER.**—*Shasta Democrat*, May 23: The 200-horse power water-wheel, pipe, etc., for the Calumet Mining Co. have arrived and been transported to the works. The wheel is the Knight patent, with all modern improvements. It will be remembered that this company bought the Spring Creek ditch, which has the first right to the waters of Spring creek, which, for nearly every month of the year, will furnish 500-horse power. This company intends, as soon as the present mill is started, to enlarge the plant to the full extent of the water-power available. When completed, Shasta county can boast of not only the largest mill in the State, but the most complete mill for saving all the valuable parts of the ore. The Calumet Co. owns several mines, with a railroad about finished, connecting the mines with the mill.

#### Trinity.

**EAST FORK.**—*Journal*, May 26: Capt. Trueworthy returned from East Fork and reports everything flourishing. He has put men to work on the Belle mine in which he is interested. He says two men have been put to work on the North Star mine getting it into shape. No work has been done on this for some time. Work is being pushed on nearly all the mines in the district.

**THE BONANZA MINE.**—Mr. Wm. Welch was in town this week. He is going to Minersville to resume operations on the Bonanza quartz mine, he and Fred, Grotefend of Redding having a lease on it. They feel confident that there is a good ledge there with plenty of gold in it.

**ON THE ROAD.**—Capt. Weaver returned from San Francisco Thursday evening, having purchased and shipped a 5-stamp mill for the Golden Chest mine at East Fork. The entire machinery has already reached Redding, and one wagon-load left there Thursday morning. It will be taken directly to North Fork from where it will be packed to the mine immediately. In a few weeks the dropping of the first stamp will be heard in the prospective leading mining camp on the coast.

**QUARTZ ON STEUART'S FORK.**—Mr. John H. Smith returned Friday from Steuart's Fork, where he has been prospecting for the last three weeks. He brought with him a sack of quartz specimens from three ledges on which he has locations; the quartz is fine-looking and carries free gold and sulphurets, the sulphurets being very rich. A small piece we saw crushed and burned out yielded a handsome prospect. Mr. Smith discovered the ledge last fall but was compelled to leave that neighborhood, as it is too high for a pleasant winter resort. He will return soon and get his locations into shape for working.

#### Tuolumne.

**QUARTZ MINING.**—*Union Democrat*, May 26: Mr. Ferguson's mill was the early part of the week running on rock from the Italian mine. It is reported that the Soulsby mine, which has for some time past been inactive, is about to resume its old time vigor and productiveness. It is rumored that the Keltz mine, situated about 13 miles easterly from the Sonora, has been bonded by an English company and will in due time resume operations. This mine at one time was very rich and yielded handsomely. The Hyde mine and mill are in operation again. This week after 2½ days' run two ounces and over of amalgam were collected from the plates on the outside of the batteries. Mr. Hyde thinks that this summer the mine will give forth big results. John Neal, Esq., has nearly completed the erection of his mill on Portuguese gulch. He thinks that in a few days it will be ready for operation. It is a Huntington mill and has a capacity of five tons per day. The water to run it will be taken from the Tuolumne Water Co.'s ditch. The Mono quartz ledge, situated about seven miles from Sonora and near the Mono road, has been bonded by Mr. W. Sharwood and operations have been commenced. The contract for the digging of the ditch from Middle Camp to the Eureka Consolidated mine has been let in sections and the work was commenced this week. The ditch will be nine miles in length. Messrs. T. Hill, N. Baule and F. Williams have leased the lead of Mrs. Dorsey in her yard. They have sunk a shaft down about 30 feet and we understand that it prospects very well. Should they find slate, which no doubt they will, there is every evidence for the development of a bonanza, as the lode is large, regular in its bearing and somewhat sulphureted. This is the same lead as the Bonanza mine, and there is no reason why it should not do as well where the above parties are working.

**A TEST.**—*Independent*, May 26: Mr. Frank Benjamin is having some 20 tons of rock hauled to the little custom-mill of Mr. John Ferguson, from Italian Camp, to make a test of the same. This new mill will be a boon to many, who can have their quartz tested without running into the expense of building a mill before they know whether the rock will pay. The sound of stamps rattling away the whole day long puts a business racket into the air of the upper end of town.

#### NEVADA.

#### Washoe District.

**CON. CAL. AND VIRGINIA.**—"Superintendent's Report," May 29: On the 1435 level the usual quantity of good ore is being extracted from stopes opened out around the winze sunk below that level. From the stopes at the north end of the main north drift a west crosscut is advanced 34 feet in quartz,

which carries some value. Ore of good quality continues to be extracted from the stopes opened out on this level. On the 1600 level ore of good quality is being extracted from stopes around the upper part of upraises Nos. 1 and 3 carried up above the floor of this level.

**SAVAGE.**—Ore shipments average 80 tons daily; pulp assays showing a value of \$25 per ton. Have begun stoping ore stripped by the 400 level south drift, which has reached the south line. Bullion on hand and shipped on May account, \$28,000.

**MEXICAN.**—On the 1300 level from the north drift, at a point opposite west crosscut No. 2, and east crosscut No. 1, is advanced 47 feet. Both crosscuts are now in vein porphyry and clay.

**GOULD & CURRY.**—From the 250 and 300 levels we have extracted 224 tons and 900 pounds of ore during the week, pulp assays of which show an average value of \$28.49 per ton.

**UTAH.**—On the 372 level, in the west crosscut, 75 feet from the upraise top, the south drift is out 223 feet and continues in clay, porphyry add quartz, showing some value.

**SIERRA NEVADA.**—On the 520 level of the drift running southwest from the main north drift, and latterly turned in a south course, is in clay and porphyry.

**HALE & NORCROSS.**—Ore shipments for the week aggregate above 1400 tons, showing an average value by pulp assays of \$37 per ton.

**BEST & BELCHER.**—On the 425 level the west crosscut from the main north drift is in 63 feet, showing porphyry.

#### Aurora District.

**AURORA'S HOPE.**—*Esmeralda News*, May 26: As it was stated last week, the strike in the Durand mine, Aurora, is considered very rich. The owners of the mine are now running a tunnel on the vein in the Live Yankee, as also one on the Antelope to tap the vein, which they expect to do by the 1st of July. Superintendent Colcord of the Durand, in company with A. E. Aon, one of the directors, departed for San Francisco last Sunday. While at the Bay city a concentrator and other machinery necessary to put the Del Monte mill in first-class working order will be purchased, when a force of men will be employed to overhaul the mill and put it in readiness to work the quantities of ore now being extracted from the mine. Mr. Ann, who has been visiting Aurora for the past two weeks, is very well pleased with the prospects, and is of the opinion that Aurora will now boom as it never has before, for the strike in the Durand has already had an encouraging effect for a number of other mine owners in the district are talking of putting men to work on their claims. The point where this last rich discovery was made is said to be fully 100 feet deeper than any place where ore has yet been taken out of the Aurora mines. There are now 31 men employed in and about the mine, and the prospects for the force being greatly increased are very favorable. The hoisting works are nearly completed, and everything will be in such shape within a few weeks that there will be no excuse for not pushing the work in the mine vigorously.

#### Belmont District.

**HOPEFUL.**—*Belmont Courier*, May 19: Belmont will see livelier times this year than it has for years past. A resumption of work in the mines of East Belmont would indeed cause a boom that would gladden the hearts of those who have pinned their faith to this district. Good times are sure to come and see this section of Nye county again—and they will come to stay.

#### Eureka District.

**ORE SHIPMENTS.**—*Eureka Sentinel*, May 26: The following number of tons of ore were shipped from the mines of the district to the furnaces during the week: Prospect Mountain Tunnel, 8 tons; Morrey, 8 tons; Woodchopper, 23 tons; Featherstone, 12½ tons; Maud, ½ ton; Williamsbury, 8½ tons; Buellbacker, 7½ tons; Ruby Hill Tunnel, 6½ tons; Banner, 9½ tons; Paul Pry, 4½ tons; Geddes, 25½ tons; McNaughton, 4 tons; May Lode, 6 tons; Giles Weller, 6 tons; Altoona, 3 tons; and Leonie, 10 tons.

**RUBY HILL TUNNEL.**—Messrs. Heubner and Scheuch have been working on a lease the Mary Aino mine, one of the Ruby Hill Tunnel claims, and came in town a few days ago with a shipment of low-grade ore to the furnaces. They brought with them a chunk of very rich-looking ore which they took from a streak discovered by them last Monday. This streak is about 10 inches thick, and is coming in at the bottom of the mine workings. The Ruby Hill Tunnel claims have been prospected but very little from the surface, the big tunnel penetrating the series being the only opening in their extensive property from which extended explorations can take place; but if their strike should prove valuable, the entire hill will soon be swarming with men anxious for tribute pitches. The company have enough ground to place on tribute nearly every miner in Eureka district.

#### Hawthorne District.

**LOCATIONS.**—*Walker Lake Bulletin*, May 23: W. A. Johnson, who has been prospecting for some weeks in Hawthorne District has made three locations, all of which show excellent prospects and are of the same quartz formation. He has one location adjoining Fred Webber's mine, the Lena, on which the croppings show signs of an excellent ore body.

#### Jett District.

**SILVER.**—*Belmont Courier*, May 19: Assays of ores from Idlewild mine, in Jett District, show that last week's statement regarding the value of the ores was about correct. The silver running from 35 ounces to 75 ounces and the lead 53½ per cent, no better showing for smelting plant can be found in Nevada. Wood and water in large quantities are found close to the mine. Even with the high rates of transportation and the low price of silver such an enterprise economically and judiciously conducted would pay.

#### Palmetto District.

**ACTIVE.**—*Walker Lake Bulletin*, May 23: At Palmetto everything is bustle and activity. Work on the new mill is progressing rapidly and it will be in operation next month, and that place shows flattering prospects for a bright and prosperous future. At Pigeon Springs, six miles distant, Charles Murphy's mill started up six weeks ago and has been running ever since, turning out more gold bullion than



REVIEW.—Salt Lake *Tribune*, May 25: The week has been cool and somewhat stormy; the output of ores and bullion rather light. The receipts for this city for the week ending May 22nd, inclusive, were for the value of \$116,352.47 of silver, \$45,327.93 was ore and \$71,024.71 was bullion. For previous week the receipts were \$37,254.43 in bullion and \$300,007.07 in ore. The Ontario product for the week was of bullion, 24,469 fine ounces; ore sales \$106.35, an approximate total of \$35,375.35. The Daily output for the week was sixteen bars of bullion, 22,321.50 fine ounces; ore sales, \$5677.93; total approximately, \$28,899.93. The Horn Silver at Frisco makes no mark in the local mining world. Fine bar receipts in this city for the week were to the value of \$44,381.44. The Hanauer smelter produced during the week bullion valued at \$14,640.00 in Germany, \$2,003.27 in bullion. Ore receipts in this city for the week were \$19,967.93 by Wells, Fargo & Co., and \$25,360 by McCormick & Co.



## SCIENTIFIC PROGRESS.

## How One Sense Sharpens Another.

SOME interesting experiments on the reciprocal influence of organs of sense have been recently made by Herr Urbanschtch of Vienna. His general conclusion is that any sense excitation has for result an increase of the acuteness of other senses. Thus, sensations of hearing sharpen the visual perceptions. If colored plates are placed at such a distance that one can hardly distinguish the colors, and various sounds are then produced, the colors become generally more distinct the higher the sounds. Similarly, one can, while a sound affects the ear, read words which one could not read before.

Again, the ticking of a watch is better heard when the eyes are open than when they are closed. Red and green increase auditory perceptions, but blue and yellow weaken them. Several musicians, however, were agreed that red, green, yellow and blue caused an intensification of sound about one-eighth, while violet had a weakening effect. Taste, smell and touch are under like laws. Light and red and green color increase their delicacy, while darkness, blue and yellow diminish it. Under the influence of red and green, taste extends from the anterior border of the tongue to the whole surface. On the other hand, a strengthening of smell, taste or touch exalts the other sensitive perceptions. Specially interesting is the reciprocal influence of touch and the sense of temperature. If one tickle the skin with a hair and plunge the hand in hot water, the tickling sensation ceases; on the contrary, if the hand be placed in cold water and a part of the body tickled, the temperature is felt more vividly. Herr Urbanschtch finds in this reciprocal action an explanation of supposed double consecutive sensations through one sense.

**THUNDERBOLTS A MYTH.**—The utter fallacy of a very popular and very ancient belief, says *Iron*, London, was exploded at last week's meeting of the Royal Meteorological Society, when G. Y. Symons, in a communication on "The Non-Existence of Thunderbolts," proved by accounts of searches after them and the exhibition of specimens that there is no such thing as a "thunder bolt," so-called. The belief in the fall of material substances during thunder storms is merely the survival of the fiction of the mythical bolts which irate Jupiter hurled at his enemies. The flash of lightning is nothing but a large electric spark, an equalization of potential between two unequally or differently electrified bodies, and there is no more transmission of a thunderbolt in a storm than there is actual transmission of material substance when we send a message across the Atlantic. The author narrated the circumstances of the so-called thunderbolts which have fallen at various localities, in all of which, when careful examination and inquiry were instituted, the circumstances, as well as the materials, such as coal, furnace slag, an old cannon-ball, fragments of brick, etc., left no doubt of the fallacies involved in the statements made current. Mr. Symons, whose object it is to abolish the common use of the term "thunderbolt" as a fiction unworthy of modern knowledge, is quite right when he says that every one—and scientific men first of all—ought to help to drive the word out of use by investigating such statements when made and giving publicity to the results. The only wonder is that the attempt of extirpating a foolish belief was not made long ago.

**COCOANUT OIL IN SUGAR MAKING.**—In the West Indies much interest is felt, says the *English Mechanic*, in an alleged successful use of cocoanut oil in a prominent factory on the west coast as a new sugar-making agent. It is claimed that its addition to the pan prior to striking, at the rate, it is understood, of about a pint to the ton, produces an enormously increased return of sugar from the massecuite. Abnormally high figures have been given for the increase, but the *Colonies and India* says: "After making every allowance for unintentional exaggeration and want of true experimental conditions, it would appear that advantage really accrues from its use. As no chemical action would be likely to occur, this advantage probably lies in the ability to concentrate the massecuite further than under ordinary conditions, the lubricating influence of the oil facilitating the striking of the pan and preventing too tumultuous boiling at the finish. Nothing is heard of its use in making yellow sugar, and experience will have to show how far the color, taste and smell of the sugar will be influenced by it."

**ASTRONOMICAL PHOTOGRAPHS.**—It is believed that some astronomical objects can be studied to better advantage in photographs than by themselves. The brain cannot always take in the perceptions of the eye fast enough and the eye is not sensitive to images whose brightness falls below a certain limit. In photography a prolonged exposure may be made to compensate for deficiency in luminous power, and the sensitive plate being competent to respond to quicker vibrations than the eye, it is possible to obtain photographs of celestial objects radiating light, which the eye is not adapted to receive. While the moon has received much attention, the photographs taken of it by Rutherford 20

years ago have not been superseded. The power of photography to portray the nebulae has been thoroughly demonstrated. The art has been applied to the observation of comets, and may yet be brought into play for the paths of meteors, the discovery of new planets and other purposes now hardly thought of. After remaining stationary for years, "at a bound it has gone far beyond anything that was expected of it, and bids fair to overturn a good deal of the practices that has hitherto existed among astronomers."

**CONSERVE YOUR FORCE.**—Hammerton says: "It often happens that mere activity is a waste of time, that people who have a morbid habit of being busy are often terrible time-wasters; while, on the contrary, those who are judiciously deliberate and allow themselves intervals of leisure, see the way before them in those intervals and save time by the accuracy of their calculations." Another writer, unknown, says: "Some men are in incessant action, early and late, and all through the day. They have no time for family or friends. As for holidays, the less for them the better. They have inherited a nervous temperament, and are doing just the wrong thing with it—allowing it to hurry them to an untimely end. They wear themselves out. Their brain is ever in a state of morbid activity almost like that of an insane man. A little careful planning and a proper laying out of work, and especially doing everything in the proper time, would avoid all such hurry and worry, make work much easier, secure an abundance of leisure and greatly increase length of life."—*Scientific American*.

**SHADOWS ON THE WALL.**—A new and true art is claimed as a development of the familiar diversion of making rude figures by the shadows of the hands on the wall. Trewey, a French artist, has added great variety to these shadow pictures, and his fast-increasing list already numbers more than 300 new forms. By patient exercise he has given his hands great suppleness, enabling him not only to represent the most diverse figures upon a screen, but to give them motion and life. The swan smoothing its plumage, the bird taking flight, the cat making its toilet, the tight-rope dancer, who, after saluting the public, rubs chalk on her feet before walking on the rope, are among the silhouettes produced of such wonderful accuracy that one can hardly believe they are shadows of the hands alone.

**MARVELOUS INVENTION IN ELECTRICITY AND PHOTOGRAPHY.**—M. Leon Esquille, it is stated, has perfected a marvelous invention in electricity and photography. By speaking in a telephone transmitter, which consists of a highly polished diaphragm, reflecting a ray of light, this ray of light is set into vibrations, and a photograph is made of it on a traveling bag of sensitized paper. Now comes the wonderful part. If the image of this photographic tracing is projected by means of an electric arc or oxyhydrogen light upon a solenium receiver, the original speech is then heard. It is evident that there is no limit to the development of this peculiar combination of methods.

**A NEW COMET.**—What appeared to be a new comet was discovered at the Rochester Observatory, N. Y., on May 20th. What appeared at first to be an aurora was noticed in the north-west sky about 9 o'clock. The supposed aurora increased in length and brilliancy and was finally discovered to be the tail of a large comet. The direction was downward of the north. The tail was very broad at first, but gradually narrowed, while the light from it increased. Astronomers at Rochester cannot identify the comet.

**THE DEVELOPMENT OF FLAME BY HARD FRICTION.**—According to the *American Review* "it is a little known fact that hard friction can develop sufficient heat to inflame benzine vapor, especially if the surface rubbed be varnished with shellac." They had also been informed by a competent and truthful mechanical engineer that the head of a "soldering iron," which is well known, is far below "red heat," had in his own experience been sufficient to set fire to an escape of benzine vapor.

**TO REMOVE WATER FROM ALCOHOL.**—Gelatin is a good absorber of water, and will not dissolve in alcohol; hence if gelatin be suspended in alcohol it will absorb, practically, all the water present, leaving the alcohol nearly pure—at least as nearly absolute alcohol as can be obtained in any way short of careful distillation.

**THE NEW EXPLOSIVE MELLINITE.**—Government experiments with the new explosive mellinite, invented by Lamm of Stockholm, show that it is more powerful than dynamite. The explosion is quieter, scattering fragments less, and it is much safer to handle.

**POCKET RULES** have appeared in oxidized silver. They can be folded up small enough to be worn as a charm.

**A NEW ASTEROID.**—M. Charlois of Nice, France, discovered a new asteroid on May 3d. Its magnitude was 13.

**PHOTOGRAPHS ON METAL.**—A process has been discovered for producing photographs on metallic surfaces.

## MECHANICAL PROGRESS.

## English and American Iron-Making.

Mr. Wm. Farnworth, a well-known English iron-master of Swindon, in some recent remarks on the rapid progress which is being made in this country in the production of iron, more than intimated that the days of English iron-making were rapidly on the wane. He said that the fact that Pennsylvania ironmasters should be able to bring their coal several hundred miles by rail and their natural gas fuel 60 miles through pipes, and yet be able to compete against English iron, suggested a wonderful train of thought touching America's capabilities. "I fear," continued Mr. Farnworth, "that if Mr. Turner and Mr. Keep paint America's capabilities in rich glowing colors we shall have a great many of our rising young men going to America. Certainly, if I was 20 years younger, I should go myself to stay, as I have been to visit America."

The Mr. Keep mentioned is superintendent of the Michigan stove factory, while Mr. Turner is an English professor of metallurgy at Mason College in Birmingham, who has recently visited this country and on his return has dared to speak plainly to his countrymen of what he has seen in this country. The discussion took place before the Iron and Steel Institute, on which occasion a fine collection of samples of American foundry-work was exhibited. Much surprise was manifested by those present at the great progress which was shown to have been made by the American iron-founders. Admiration was expressed during the discussion at the low sulphur which appeared in the analyses, and our success in this particular was attributed in much part to the character of the fuel dealt with in America. Another point which occasioned expressions of great surprise was the circumstance that high silicon ores were produced from the clay-stoves. These stoves, Mr. Turner declared, were exactly the same stoves as exist to-day in South Staffordshire, and from which we never expect to get glazed iron. The silica in the American ore appeared to be very much higher than in the Staffordshire mineral.

## Rapid Work of American Furnaces.

The large production obtained at American blast furnaces created some uneasiness among the Staffordshire furnace-owners. It was admitted that America was in this respect "putting England in the shade," but it was urged in defence that considering the high-blast pressure used in America, something like eight pound to the square inch as compared with four pound or five pound in English practice, the American furnaces ought to produce 100 per cent more than those of the mother country. In support of the present practice in this country the opinion was quoted of the late Manchester meeting of the iron and steel institute, where this same question came up for discussion, that the rapid driving of America would not be found suitable to the ores and fuel available to the English pig-maker.

One speaker, however, remarked that an eight pound blast pressure had, he believed, been frequently adopted in Wales where an anthracite coal was used. Anthracite coal, too, always gave a low silicon iron. It was an absolute necessity to have a high blast when employing anthracite, and this was one of the great difficulties found in working anthracite in this country. It was remarked that we shall most probably have to remain content in England to see America go ahead in this matter of pressure. The much greater frequency with which furnaces were blown out and in in America, than with the English, was remarked upon as attributable to the same high-pressure driving.

## What Would Result From Free Trade.

It is hardly to be expected, remarked one of the speakers, that English pig-makers will submit to hearing the praises of American pig-manufacture sung in their presence without having something to say regarding American tariff duties. "If they were to come to free trade where would they be?" challenged Mr. James Roberts of West Bromwich, one of the largest chilled-roll makers in Staffordshire. "Is it not a fact that but for protection in America we could undersell them in all their home markets? We could send there millions of tons more iron than we at present produce if we had not to pay a duty of 45 or 50 per cent."

Mr. Farnworth declined to accept the challenge to enter into a discussion on the American tariff. Indeed, he questioned the wisdom of alluding to the matter at a time when the subject was so prominently before the American public. "Was it wise," he asked, "to allow the American ironmasters to see that we were at all anxious for a change in the tariff? The mountains of iron ore possessed by America and the rapid driving of her furnaces, would always give her advantages over England."

**COMBUSTION AND ITS MANAGEMENT.**—The Scientific Commission has reported that of 5,000,000 tons of coal annually consumed in London, 3,000,000 are combusted, and 2,000,000 go off in smoke and gas to create fogs and injure health and property. Doubtless, a like inquiry into the waste of fuel in this country would result in substantially the same conclusion, especially where soft coal is used. Our housewives do not realize that of every five cords of wood they burn, one is literally thrown away, and so of coal, but such is the fact. The

process of combustion is continually going on within us and around us. It is simply the union of the oxygen of the air with substances for which it has affinity. In our body the oxygen unites with the waste tissues of the body, and produces heat without visible flame. The rusting of iron is combustion, flammability, and without sensible heat. Though the supply of oxygen is as exhaustless as the air, of which it forms one-fifth part, yet not a surplus atom of oxygen enters into the process of combustion. There are two compounds of oxygen with carbon. One atom of oxygen unites with one atom of carbon, or two atoms of oxygen unite with one atom of carbon. Never an atom and a half of oxygen with an atom and a half of carbon. The union of these two elements is exact, entire and always the same under all circumstances.

**THE WORKING SURFACE OF A PULLEY.**—It has taken some time to settle the question in regard to belts made of leather as to which side should run next to the shaft wheels, and even now, is rehearsed occasionally for a mill man to dwell upon. It is a pleasure to see the best side of a belt stand out whenever a new belt is to be set in motion, and good looks go a great way on all such occasions, in spite of all the tests that have been made on leather belting. But nothing has ever been said of the extra cling that the flesh side gets by being easily squeezed into every depression on the face of the pulley, which the grain side has a tendency of bridging over. This seems to follow more in accordance with the laws of friction where the particles of one material have a chance to interlock themselves with those of another. Pulleys covered with leather, and wheels made of hard wood of all kinds have given much greater driving power from the same grasp of belt than nicely polished pulleys have done, made of metal, though this class of wheel has all the advantages that are to be derived from atmospheric influences. But the fine imperfections on a true surface, which are the real gear teeth of friction, is not there in the abundance found in the material that is closely allied with the helting itself. Everything would seem to indicate that a driving wheel is finished in the wrong direction when a covering of leather adds so much to its driving capacity. The teeth of gear wheels are not cut lengthwise of the driving face, and the slightest crease crosswise gives all the hold that its strength will allow. To turn off a pulley with the finishing cut taken crosswise and ground on a polish, herring-bone fashion, may not be appreciated in the machine-shop, but the object to be attained is the very one that a draw file is used for to pitch the minute grooves found on every surface in the right direction. —*Boston Journal of Commerce*.

**A NEW METHOD FOR PRODUCING STEEL PIPES.** Some two or three years ago, experiments were made in Germany by Herr A. Mannesmann, with the object of discovering a new method for manufacturing steel pipes, and these experiments were so successful that a syndicate was formed to erect works at Burbach, where the method, which is to be employed by the new company at the Old Steel Works in Swansea, Wales, has been in operation ever since. The patent rights granted to Herr Mannesmann, on the authority of the Berlin *Eisenzeitung*, were sold to Messrs. Funke & Ebers of Hagen, Germany, and to a large firm in Paris, who proposed to employ the process in the manufacture of copper tubes. An estimate of the importance of the new process may be gathered from the fact that the capital of the German syndicate was \$300,000. By the new method, the difficult and expensive process of boring is avoided, the tubes being cast by an adjustable core, which accommodates itself to the contraction of the metal on cooling, and thus prevents cracking. The steel cup obtained in this manner is then rolled in an ordinary train.

**A GIGANTIC ENGINE.**—A compound Corliss engine, of a gigantic description, has been produced at one of the Scottish foundries, designed for a cotton-mill in Bombay. According to the description the high pressure cylinder of this immense engine is some 40 inches diameter, and the low-pressure cylinder 70 inches, each having a stroke of six feet; and the fly-wheel, which weighs about 110 tons, is 30 feet in diameter by 8 feet 6 inches wide, grooved for 38 ropes, by which the power is transmitted to the various lines of shafting in the mill. The engine runs at the rate of 60 revolutions per minute, thus giving a speed of ropes of considerably more than one mile a minute. The crank shaft, made of the best Whitworth fluid compressed steel, is 25 inches in diameter in the body and 20 in. in the bearings. The steam pressure is rated at 100 pounds per square inch, and the engine works easily up to 2500-horse power.

**FLAT R. R. WHEELS.**—A potential danger of flat wheels not generally recognized was recently pointed out by Mr. C. A. Gilchrist, superintendent of the Fort Madison & Northwestern R. R. He said that in testing a bridge in the usual way with a heavy locomotive nothing unusual was shown, the deflection of the structure having been only one-fourth inch. But in the train hauled by the locomotive there was a flat wheel, and when it struck the bridge it caused a deflection of 1½ inches. The difference was so striking that it would be interesting and important for some road to investigate the extent of deflection due to flat wheels.



## GOOD HEALTH.

## Hydrophobia and Humanity.

Hydrophobia has been recognized for ages, and throughout all these ages has defied medical skill. The first known mention of it was in the manuscript of a Hindoo physician, Susruta, who lived nine or ten centuries before Christ. His account of it and treatment recommended—sacrificing—embodied all that is known today upon the subject, unless the findings of Pasteur are entitled to credence. Mention of hydrophobia was frequent after the beginning of the Christian era. Aristotle, Ovid and Pliny alluded to it. In the day of Nero it was observed and treated. According to Plutarch, in the time of Pompey the Great, it was first seen in human beings, and the distinction, still maintained by some authorities, between rabies and hydrophobia began to be made. Celsus Aurelianus, in the reign of Trajan, gave a detailed account of the disease and the controversies which had arisen concerning it. He told of a seamstress, when, in tearing with her teeth a garment worn by a patient, acquired hydrophobia and died. Then, as now, hydrophobia acquired by inoculation was regarded as necessarily fatal, but it had also been proved that many bitten by rabid dogs escaped any special inconvenience. Among the Arabs also the disease was known. Rhazes told of the barking symptom, which is simply a spasmodic cough, and of the fear of water, generally present when the subject is human and sometimes utterly wanting in the lower animals. Later, hydrophobia was freely discussed by European writers. The "Laws of Howell the Good" tell of a general outbreak of rabies, occurring in 1026. From that time it was recognized in England. Upon the continent it remained obscure until the thirteenth century, when 30 shepherds in Germany fell victims to it. It appeared near Boston in 1768; in the French West Indies in 1776. In 1785 it was alarmingly prevalent in the United States again, but in South America was unknown until 1803.

**INTELLECTUAL LABOR AND LONG LIFE.**—Among artists, Michael Angelo lived to be 90, Sir Christopher Wren to be 91. Titian is said to have been engaged in painting a picture now in the Academy at Venice where he was cut off by the plague at 99 years of age! Conrad Roppel of the Hague, who lived to be 100, and Iogree to 86, Tintoretto 82, Claude Lorraine 82, Greuz 79, David 77, Turner 76, Horace Vernet 73, Lebrun 71, Poussin 71, are instances not only of greenness in art, but greenness in enduring vitality. If we take poets, we find that Rogers lived to be 93, Sophocles 90, Coleridge 87, Juvenal 86, Anacreon 85, Voltaire 84, Metastasio 84, Euripides 78, Goethe 83, Klopstock 79, Wieland 80, Lamartine 78, Beranger 77, and Victor Hugo 83. If we turn to philosophers and men of science we find among our contemporaries M. Chevreul, the French philosopher and chemist, who on the evening of his one hundredth birthday occupied the President's box at the opera; and if we look into the past we find the names of Fontenelle, who died at 100; Hays (who wrote the treatise on whist) at 98; Hobbes at 92; Morgagni at 89; Ried at 86; Dr. H. Burden at 90; Sir T. Watson at 90 (?), Sir William Lawrence at 84; Rayer-Collard at 82; William Harvey at 80; Schelling at 79; Cousin at 76, and, greatest of all, Plato at 82; and among great composers, Auber died at 88; Cherubini at 82; Rossini 77; Haydn 77; Gluck 79; and Mozart 72. What a stupendous amount of brainwork, and brainwork of the highest kind, is represented by these names, all of whom exceeded the allotted threescore years and ten, but who are lost sight of in the delusive method of averages! Of the longevity of judges and dignitaries of the church, who also represent a great amount of useful brainwork, evidence has already been given.—*Nineteenth Century*.

**USE NO SUGAR ON OATMEAL.**—"Be careful how you eat oatmeal," said a doctor recently. "Oatmeal is a very healthy food if taken properly. No food is healthy if improperly used." "How should it be eaten?" "If oatmeal is eaten in excess of the needs of the body for proper nutrition, it overloads and taxes the system. It must not be eaten partially cooked. Flour, cornmeal, rice, and other approved articles of wholesome diet are not healthy if half cooked. If an excess of sugar or other sweets is used, it will disagree with many people, causing indigestion. If eaten with an excess of cream, it will not be healthy for some persons whose stomachs are too delicate to stand a rich food. Oatmeal is a healthy food when not used for overfeeding, when sufficiently cooked, and when not used with an excess of cream or sweets. Oatmeal should be eaten without any sweets, using a little milk or cream, a little butter, and seasoned with salt, as the Scotch do."—*New York Mail*.

**SELF-MASSAGE FOR DYSPEPSIA.**—J. N. Semple, in the *Herald of Health*, recommends self-massage as a remedy for dyspepsia. His method is as follows: "First thing in the morning and last thing at night rub the abdomen down the left side and up the right in a circle, also rub down the breast; now pace across the room once or twice, and then snap the lower limbs, like a whip-lash, for exercise. Now twist the lower limbs, first on one side, then on the other, and rock up on the toes. Now for the lungs and abdomen; first take in a half-breath,

then exhale all the air possible, then fill the lungs to their full capacity, walk across the room and back, at the same time throwing the arms back. Now in a half-breath send out every particle of air till you see the abdomen working like a bellows, and you will soon become a deep breather. For more extended practice in deep-breathing this morning before rising is a good time, provided there is full ventilation and the air inside is as pure and fresh as that on the outside. Before a good fire wash the hands and wet the back of the neck, arms and lower limbs slightly and rub down with a coarse towel. This is sufficient for a beginner, but entirely inadequate for the old, chronic dyspeptic.

## For Sprains.

**EDITORS PRESS:**—Take the strongest vinegar you can get; add all the salt it will dissolve. Heat and saturate flannel cloths, and apply to the hurt as hot as the patient can bear. Then envelop in dry flannel. Repeat the process every 10 or 15 minutes until the pain is relieved. As one of my ankles is just recovering from a severe sprain, I can testify with a clear conscience to the efficacy of this remedy. We have used it in our family ever since I can remember.—D. J. O., *Spadra, Cal.*

**GOOD AND BAD NEWS.**—Good and bad news has a contrary action on the heart. Bad news weakens the action of the heart, oppresses the lungs, destroys the appetite, stops the digestion and partially suspends all the functions of the system. An emotion of shame flushes the face; fear blanches, joy illuminates it, and an instant thrill electrifies a million of nerves. Surprise spurs the pulses into a gallop. Delirium infuses great energy. Volition commands, and hundreds of muscles spring to execute. Powerful emotions often kill the body at a stroke. Chilo, Liagoras and Sophocles died of joy at the Grecian games. The news of defeat killed Philip V. One of the Popes died of an emotion of the ludicrous on seeing his pet monkey robed in pontificals, occupying the Chair of State. The Doorkeeper of Congress expired on hearing of the surrender of Cornwallis. Eminent public speakers have often died in the midst of an impassioned burst of eloquence, or when the deep emotion that produced it has suddenly subsided. Lagrange, the young Parisian, died when he heard that the musical prize for which he had competed was adjudged to another.

**BIRD SKINS AS GRAFTS FOR WOUNDS ON HUMAN BEINGS.**—Dr. Redard has communicated to the Paris Academy of Medicine some observations regarding the advantages of the skin of birds for grafts on wounds of human beings. He takes the skin from beneath the wing of a chicken, carefully securing the subjacent cellular tissue, but avoiding the adipose tissue. The transplanted pieces varied from a sixth to a third of an inch in size, and they were maintained in position by means of a little cotton wool and iodoform gauze. The skin of birds and fowls has the advantage of being supple, delicate and vascular, and is readily adapted to the surface of a wound, where it adheres without undergoing absorption. In a case of severe burn of the scalp, of eight months' standing, in a child two years old, he obtained rapid cicatrization by means of grafts from a fowl. The wound measured 3 inches by 2½, and completely healed in two months.

## USEFUL INFORMATION.

**PREVENTING THE RUSTING OF SHEET IRON STOVES.**—In answer to an inquiry regarding the rusting of sheet-iron stoves, the following suggestions may be observed to advantage: The room where the stove is located may seem to be dry, yet be so cold as to condense more or less moisture upon the iron, and a rapid corrosion is the result. Covering up with paper has been frequently tried as the best method of preventing rusting upon the outside. If a heater drum rusts from the inside, as it is apt to do, it will be a good plan to disconnect it from the chimney and tie papers over the pipe-hole in the heater. This prevents draught through the chimney into the body of the drum, and prevents the formation of moisture upon the inside of the drum, as the air becomes cooled. If the heater could be disconnected all around, and have a dish of lime placed in the inside to absorb the moisture, there would be little trouble. All circulation of air through a heater or furnace should be prevented by closing all of the openings, and, above all, have all ashes and soot taken out as much as can be.

**AN ODD FACT ABOUT GUN COTTON.**—When gun cotton or other high explosives are freely exposed upon an iron anvil and detonated, says a chemical expert, the explosive leaves a deep and permanent impression upon the surface of the metal with which it was in contact. The impression produced by the exploding mass is an almost exact copy of that face of the explosive which was in contact with the metal. This is best observed with gun cotton, for, from the nature of the material, it can be shaped according to fancy, and such figures and designs as one wishes can be stamped upon its surface. Thus if a disk of gun cotton, on the face of which the letters "U. S. N." and the date "1884" are indented by detonated, it will be

found that the letters and figures will be reproduced in the iron, and, most singular of all these phenomena, they will be indented in the iron just as they were in the gun cotton.

**IMPROVED DIAMONDS.**—Many persons have been puzzled, says an exchange, to understand why the diamonds worn in earrings by ladies nowadays maintain such a ceaseless quivering motion. It makes no difference that the head of the wearer is in perfect repose, and that she is even speechless, and therefore exerting no muscle of face or features. The ceaseless twinkle of the diamond goes on, enhancing greatly the flashing beauty of the gem. The secret is in the setting of the diamond, and the method is a patented device. The patent is reaping a royalty of \$50 a piece from every manufacturing jeweler to whom he sells the privilege of using it. The stone is set in the usual manner, except that a band like the handle of a diminutive basket is attached to the frame-work. On the other side of the band is a cup-like cavity. On the lower part of the hoop is a projecting pin, pointed with rhodium, a metal which never wears out—something like the iridium with which gold pens are tipped. Now, when the diamonds are put into position on the hoop, the rhodium point projects into the cup. The result is what scientists would call a condition of unstable equilibrium. Like the pea blown with a pipe by a school boy, the diamond is given no rest, with the difference that no effort is required to keep it dencing. The metal point never wears out.

**PAPER BLANKETS.**—Many of our readers, says an English journal, will remember that a few years ago an attempt was made to introduce paper blankets, and the promoters of the scheme hoped that the great cheapness of their goods would lead to their very largely displacing the ordinary products of Dewsbury, Swerby Bridge and Witney. These hopes were, however, disappointed; no one could be induced to buy the paper blankets who could anyhow afford to pay for woolen ones, and little has been heard of the matter for some time. The idea has now, however, been revived in France by a Lisieux manufacturer, who claims to have invented a paper blanket at once cheap, warm, elegant, and very good for the health. We fancy he will have a good deal of trouble in establishing it in popular favor.

**VEILS OF SILVER THREAD.**—A strip of fine wire gauze is the newest thing in veils. It is as delicate as the dainty silk affairs which women persist in pulling down over their noses, and much less injurious to the eyes than the dotted or figured net so common upon the street. In appearance it does not differ at all from the ordinary, except, perhaps, it may be thought less flexible. The wire-gauze veil is not in the market, but women have brought a few from England, where they are beginning to be used, chiefly because they are better respirators than silk, which persists in choking one's breath and plastering itself down upon the face if the air is ever so little damp. A veil of silver thread is very ornamental.

**FLOWERS IN WATER.**—At a recent horticultural meeting flowers were exhibited in a glass filled with water and fitted with a wide and flat stopper. To the stopper the flowers were attached and then carefully introduced into the water in the globe, the stopper completely filling the mouth of the globe and being wide enough to stand safely. By turning the whole arrangement so that it stood on the stopper, the flowers were left completely surrounded by water. The water magnified the flowers, and a pleasing optical illusion is the result. Flowers thus immersed will keep twice as long as those in the air.

**SURFACE COLORATIONS.**—A Garman company has patented a process for producing surface colorations upon articles made of copper, zinc or brass. Upon the first-named metal it is possible to develop all the colors of the rainbow, and upon zinc the coating is formed of such thickness as to permit of chasing the surface. The most important application of this invention seems to be in the imitation of antique bronze, the results in this direction being very satisfactory, both in the matter of durability and resemblance.

**HOW TO PRESERVE EGGS.**—Take a teaspoonful of salt, and lime the size of an egg, and pour boiling water on them. When cold, drain off the liquor and put it on your eggs. If too strong, there will be a crust on top; if so, add more water. This is for two gallons of liquor. There is no receipt that beats this, and it can be relied upon. Eggs put down in August and used in April are just as fresh and make just as nice frosting as newly laid ones.

**HOW TO PREPARE A BLOTTER THAT WILL REMOVE INK.**—American *Druggist* tells how to prepare a blotter that will wholly remove ink spots from paper. Take a thick blotting paper and steep it several times in a solution of oxalic acid or oxalate of potassium. While the spot is still moist apply the prepared blotter and the ink will be entirely removed.

**IMITATION IVORY.**—Much of the so-called ivory now in use is simply potato. A good sound potato washed in diluted sulphuric acid, then boiled in the same dilution, and then slowly dried, is all ready to be turned into buttons, poker chips and innumerable other things that ivory was used for once upon a time.

## ENGINEERING NOTES.

## Stopping Railroad Trains.

To illustrate the importance of the prompt stoppage of railroad trains and the difficulty of securing them, various statements have been made. It is said that in one second a train traveling at 60 miles an hour passes over 88 feet; at 45 miles an hour, 66 feet; and at 30 miles an hour, 44 feet. The time required to move a distance of 100 yards is 3.4 seconds if the train is running at a speed of 60 miles an hour; 4.6 seconds if the train is running at a speed of 45 miles an hour; and 6.8 seconds if the train is moving at a speed of 30 miles an hour. The difficulties to be overcome in securing a quick stoppage, after the locomotive engineer endeavors to stop the engine, arise chiefly from the momentum of the train, which varies with its weight, the speed at which it was progressing and the grade of the line on which it was moving. Captain Douglas Galton, in a discussion of this subject, stated that "a train, through the locomotive, slowly accumulates energy, and for each ton of weight in the train the accumulated energy is equal to 120 foot-tons at 60 miles per hour, 53 foot-tons at 40 miles per hour, and 13 foot-tons at 20 miles per hour. Thus for a train of 15 vehicles, weighing 200 tons, the energy at 60 miles per hour is equal to 24,000 tons falling a distance of one foot, or approximately to the energy of a shot from the 80-ton gun."

Scientific experiments in England, made in 1875, demonstrated that with the hand brake then in use a train of a locomotive and 13 cars moving at a speed of 45 miles an hour could not be brought to a stand in less than one minute, or before the train had traversed a distance of half a mile.

In the closing months of 1887 practical proofs of the efficiency of the new system were furnished to large audiences of railway experts assembled at points near a number of leading cities. The average results of 11 of these tests were summarized in the following statement:

"A train of 50 cars of a total length of 1900 feet, weighing about 1,700,000 pounds, running 20 miles an hour, can be stopped by the use of hand by five men, all ready, and under the most favorable circumstances, in 1563 feet. By the air brakes, the same train, running at the same speed, can be stopped in 171 feet, or less than one-ninth the distance required by hand brakes. As in cases of genuine emergency the air brake is ready for immediate action, and the brakemen never are, it is fair enough to say that the air brake stops the train in one-tenth the distance required by hand brakes. The same train, running at a speed of 40 miles an hour, is stopped by the air brakes, in a distance of 646 feet. These stops are made with the braking power low, as it is to be used, in ordinary service, so that it will not elide the wheels of empty cars. With the braking power increased so as to make the quickest possible time, regardless of sliding the wheels, a train of 20 cars, running at 20 miles an hour, is stopped in 96.7 feet, and running 40 miles an hour is stopped at 388 feet."—*Railway Age*.

## A Wonderful Tunnel.

An engineering work that has taken over a century to construct can hardly fail to offer some points of interest in its history, and illustrate the march of events during the years of its progress. An instance of this kind is to be found in a tunnel not long since completed, but which was commenced over 100 years ago. This tunnel, or adit, as it should be more strictly termed, is at Schemnitz, in Hungary. Its construction was agreed upon in 1782, its object being to carry off the water from the Schemnitz mines to the lowest part of the Gran valley.

The work is now complete, and it forms the longest tunnel in the world, being 10.27 miles long, or about one mile longer than St. Gotthard, and 2½ miles longer than Mount Cenis. The height is 9 feet 10 inches and the breadth 5 feet 3 inches. This tunnel, which has taken so long in making, has cost very nearly a million sterling, but it appears to have been well spent; at least the present generation has no reason to grumble, for the saving from being able to do away with water raising appliances amounts to £15,000 a year.

There is one further point, however, worth notice, for if we have the advantage of our great grandfathers in the matter of mechanical appliances, they certainly were better off in the price of labor. The original contract for the tunnel made in 1782 was that it should be completed in 30 years and should cost £7 per yard run. For 11 years the work was done at this price, but the French Revolution enhanced the cost of labor and materials to such an extent that for 30 years little progress was made.

For ten years following much progress was made, and then the work dropped for 20 years more until the water threatened to drown the mines altogether. Finally the tunnel was completed in 1878, the remaining part costing £22 a yard, or more than three times as much as the original contract rate.—*Engineering*.

**ELECTRIC RIFLES** are the latest. Instead of the ordinary percussion firing device a dry chloride of silver battery and a primary coil will, so it was lately stated before the American Institute, fire the rifle 35,000 times without recharging.





A. T. DEWEY.

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See Advertising Columns.

## Passing Events.

The citizens of Helena, Montana, have set an example of enterprise in subscribing \$200,000 toward a big smelting plant in that city, which might well be followed elsewhere. It will have the effect of making quite an extended area of mining country tributary to that city. The works will be erected at once.

Electric power will shortly prove its efficiency on the Comstock lode. It is probable that after the results are properly realized it will be introduced elsewhere in that region.

A great deal of mining machinery is now being made in this city—more than for some time past. Considerable is being shipped to Australia and other points outside the United States.

There is more industrial activity in San Francisco at present than has been the case for

years. All the foundries and machine-shops are busy, and building operations are extensive.

Railroad building is quite active all over the State this season. New regions are being brought into market and settled up, and many towns, formerly isolated, now have railroad connection with centers of trade.

## The New Kingdom of Araucania-Patagonia.

A Mining Region of the Future—Brilliant Chances for New Commercial Relations.

The attention of this civilized world has been so constantly directed to the south and east of Europe during the past decade or two that the creation of a new kingdom in the southern extremity of the American continent is almost unknown even to the reading public. Yet such is the case, and it is the intention of this writer to briefly review the most important historical facts and to present a sketch of this country and its resources.

Araucania is immediately south and southeast of Chili, being separated by the river Bio Bio, extending southward to the German Colony of Valdivia and east to the eastward of the Andes. The coast line extends about two and a half degrees of latitude. The capital of the kingdom is Perquencot, and is inhabited chiefly by Europeans and Creoles.

In 1540, the Araucanians fiercely defended the holy cause of liberty against the Spanish naval forces of Philip II, commanded by Don Garcia de Mendoza and Pedro Valdivia. In 1573, Chili, as a State, was conquered by the Spanish and made subject to the Viceroy of Peru, but Araucania, through its conspicuous valor and skillful resistance, maintained its proper independence.

In ancient times the Araucanians consisted of a powerful confederation, divided into four principalities. Each principality was governed by its own chief, called *Toguis*, and each was independent of the others, except when uniting for deliberation in war against a common enemy, and for public welfare. The language is known as the Chilena, or Molucca, and the dominant religion a belief in a plurality of gods, similar, in some respects, to that of the ancient Greeks. They believe in metempsychosis and the immortality of the soul.

Patagonia, or Magellan's Land, was discovered by Magellan in 1519. It is a vast peninsular region, bounded on the east by the Atlantic ocean, on the south by the strait of Magellan—separating it from Terra del Fuego, on the west by the Patagonian Andes—leaving a narrow strip of undesirable, rocky land, controlled by Chili and Araucania, and on the north by the Argentine Republic. The northeasterly boundary is formed in part by the Rio Negro, the northern extremity of the country reaching to 34° latitude south, presenting a total length of territory of about 1100 miles. The total area of Patagonia, east of the Andes is about 300,000 square miles, while Araucania furnishes about 22,500 square miles additional.

The interior of Patagonia is inhabited by the Araucanians, or Puelchi, in the northern portion, and the Patagonians or Tuelchite, properly so called, in the south. In the north are immense forests of cypress, pine and oak, while the vast plains, extending eastward from the Andes, are covered with grass and shrubbery, and afford abundant pasturage for immense herds of cattle and horses.

The climate is mild and temperate in the north and rainy in the south. The lowlands are dry. Spring commences in September, summer in December, autumn in March, and winter in June. Epidemics are unknown, and the absence of venomous reptiles, is a marked fact.

A better idea of the climate may be obtained from the products, such as cereals and fruits, the former being even now raised in sufficient quantities to admit of exportation, and systematic agriculture has not yet been attempted. The fruits most raised are olives, figs, oranges, grapes and apples, while hemp, tobacco, etc., are grown without the slightest difficulty. Minerals and ores are abundant, the most important being copper, iron, nickel, antimony, tin, mercury, agates, amethysts, silver and gold. The most important silver mines, those which in ancient times yielded the greatest quantities of this metal, were closed at the time of the attack by the Spaniards under Mendoza, and

have not since been opened, fearing that their working would precipitate new attacks by Chili and the Argentine Republic with a view to conquest.

In this year 1853, says Comm. Talckes, the yield of gold reached \$60,000,000 francs (\$173,600,000), but at present the production is less than 500,000,000 francs (\$100,000,000). The MINING AND SCIENTIFIC PRESS, in its issue of December 4, 1886, states that Mr. E. L. Baker, U. S. Consul at Buenos Ayres, has furnished information respecting recently discovered gold-fields at the southern extremity of Patagonia. Several thousand claims have been disposed of to about 200 different persons, but it is said the best ground is owned by Messrs. Nield & Co. and Lezerna & Co. Mr. Baker says if it proves true that there is gold at Cops Virgenes it must be washings from the Andes, and that still farther inward it must be discovered in larger quantities. Parties are now prospecting the gulches nearer to the mountains. This way of approach from the east is from Buenos Ayres to Sandy Point via the Liverpool and Pacific steamer, thence by trail 150 miles to Cape Virgenes.

The hither way of reaching this country from the Pacific side is to take one of the steamers of the German line which trade between Hamburg or Bremen, and the Chili and Peru sea ports, and even as far north as Guatemala.

Perquencot, the capital, is situated in the northwest portion of the kingdom, east of the Andes, and, as has been stated, is inhabited chiefly by Europeans and Creoles—i. e., descendants of the former. There are excellent shipping points on the Atlantic seaboard, but the harbor at Valdivia, on the Pacific, is said to be one of the best on the west coast of the American continent.

On the 6th of November, 1860, the nation offered the royal crown to M. de Tournans, who was placed upon the throne of Araucania and Patagonia under the name of King Orelia Antonio I.

M. de Tournans was a chivalrous and learned French citizen, who, being a lover of science, was carried into this distant region for the prosecution of that study and the observation of natural phenomena. Affable but modest, courteous, gentle and charitable, he soon acquired the affections of the people, who subsequently elected him their king.

The first care of the new sovereign was to nominate a ministry; to give the people a constitution; to establish a succession to the throne in the line of direct descent; to establish the privileges of the king, and the unity of the people in the presence of the law. He divided the kingdom into departments and districts, under the control of prefects.

When King Orelia died without male issue, it became necessary for the country to elect a successor who should, in all respects, be as accomplished and as devoted to the welfare of the nation as the last Sovereign. Such a one was found in the person of M. Gustave Achille Laviarde, Prince of Aucus, Duke of Kialeon. The nation acknowledged and confirmed him the Sovereign of the free and independent State under the name of King Achille I. This act of recognition was officially confirmed by the chiefs and registered in Paris on the 26th of June, 1882.

Since that time Consulates have been established in various cities in Europe, and efforts are now progressing favorably toward recognition of the Kingdom by the Italian Government. It is also learned from foreign journals that a company of wealthy merchants are endeavoring to obtain from the King permission to colonize certain portions of Araucania, to cultivate such cereals and fruits, and to secure hides, wool, and ostrich (*Rhea*) plumes, for which they find an excellent market.

A prominent writer regarding this Government (in *L'Epee*, 1886), says: "France, through fear of becoming compromised with Chili and the Argentine Republic, is yet uncertain whether it ought to accord or not its protectorate to the people of Araucania and Patagonia, but it might in the end certainly intervene in this question, which is so warmly agitated, not only because they have solicited its protectorate through a chief who is French by birth and in heart, but lest it might repent too late the error committed when King Achille shall have accepted the protectorate offered by a nation so powerful as Germany."

Thus will be seen an exhibition of the feeling

and desire, on the part of many Europeans, to secure speedy recognition of this new kingdom, as there is, without doubt, an excellent opportunity to establish commercial relations with a country rich in native products which, if once accomplished, will be not only an impetus to the rapid development of the country itself, but it will be a source of wealth to the pioneers in commerce toward this portion of South America.

## The Mining Bureau.

The State Mining Bureau is doing more field work this year than ever before, and as a result the reports will hereafter be of more value to the mining community. The Legislature, at its last session made it obligatory that this field work should be done. Investigations are being systematically made in several branches. One in particular has long been needed; that is, inquiry into the subject of milling gold ores. There is more inquiry made in this direction than any other, but there is no published data to which people can be referred. All the details of operations and results in milling are being studied and the facts collated. The Bureau will now become better known and appreciated than it has been.

It was only last week that we read in an Idaho paper (the *Coeur d'Alene Record*) the following paragraph under the title of "The Lick Mining Bureau": "A part of the \$5,000,000 donated by James Lick of California for scientific purposes, has been devoted to the establishment of a mining bureau where all kinds of ores are gathered together and placed on exhibition, and they come from all parts of the world. If any mining man should go there he would find it well worth his visit, and an explanation is furnished free by Prof. William Ireland."

From this it appears that everybody does not know that the State Mining Bureau was established and is supported by the State of California. James Lick, who left a great deal of money for several useful purposes, gave nothing to the Mining Bureau. It was not thought of until after his death. The late Joseph Wason was the man who originated the idea, and got the first appropriation for the Bureau through the Legislature. Henry G. Hanks was the first State Mineralogist, and since he resigned Wm. Ireland, Jr. has filled the position.

But ignorance concerning the Bureau and its objects is not confined to distant points, strange to say. One of the daily papers in this city this week announced that James W. Crossman was about to take the field for the Bureau and search for new mining ground, and that he was provided with a complete prospecting outfit. Now, Mr. Crossman was provided with no such thing, and is not going to hunt for new mining ground. The Mining Bureau has nothing to do with prospecting for or developing mines. Mr. Crossman has gone to ascertain for the Bureau the condition of mining in two counties of the State, the number of mines, mills, furnaces, etc., and to obtain information for the State Mineralogist's report. He has nothing to do with looking for new ground or prospecting, neither has anybody else in the Bureau's employ. The only object is to gain information as to the progress of mining industry in California, and as the State pays for the work, nothing is considered outside of our boundaries. Ores and minerals are accepted from other places, when donated, of course; but as far as the Bureau's investigations are concerned, they are confined strictly to California. It reports on what is being done in mines and mills that are being worked by other people, but does no mining or prospecting of any kind.

## Extra Pages.

We publish this week a supplement to the PRESS, making the paper one of 20 pages instead of the usual 16. It is our intention to publish at least four extra pages in the first number of every month hereafter, paying special attention to industrial matters and such things as will be of interest and value to millmen and mechanics. The milling industry on this coast is now one of large proportions, and is steadily growing. All of our manufacturing industries, local and interior, are becoming of more importance from year to year. It is the desire of the publishers of the PRESS to improve it as much as possible, and it is with this object in view that we have increased the number of pages.



## The Sierra Buttes Mine.

It appears from the semi annual report of the Sierra Buttes Gold Mining Company, lately submitted to the shareholders in London, that the ore yielded during the past half-year only \$4.96 per ton in free gold and 83 cents per ton in sulphurets, making a total of \$5.79 per ton, this being \$1.62 per ton less than the yield for corresponding periods during the preceding four years. But this fall-off in the value of the ore was made up in part by a reduction in the cost of mining and milling from \$4.84 per ton previously to \$4.06 last year, when the net profits realized were \$1.73 per ton. There were mined and milled during these last six months 24,908 tons of ore, giving \$144,227.32 gross and \$43,090.84 net returns. Out of the latter \$15,000 were disbursed to the shareholders in dividends, the balance having been applied toward liquidating the indebtedness of the company for their new mill and other improvements.

Toward the end of the year the value of the ore declined to four dollars per ton, and for a time dropped even below the cost of extracting

## A New Ore Concentrator.

Chas. C. Rueger, the well known metallurgist of Anaconda Mountain, has just obtained a patent through the MINING AND SCIENTIFIC PRESS Patent Agency for one of that class of concentrators known as buddles or round tables. The object of the invention is to increase the working capacity of such machines, and at the same time to improve the quality of their performance and simplify the machinery required for such results. These objects are attained by a combination of old and new parts.

The concave round table is constructed in any approved manner, and another convex round table is similarly made. Both of these tables are affixed to one vertical shaft, which is revolved by some suitable driving mechanism at the top. A receiver is supplied for the various products flowing from the upper tables, and which are to be reworked on the lower table. This trough or receiver is stationary and rests on a suitable frame suspended to beams overhead. The products from the lower table pass on to an encircling cone, which presents to them a very much larger surface and therefore

## Coarse and Fine Ore-Crusher.

The PRESS of April was published a description of the Gates ore-crusher which is now being introduced on this coast. It has been in use for some years in the East, crushing macadam and railroad ballast, and has been found very efficient. The accompanying cut represents one of these machines arranged for combined fine and coarse ore crushing with return elevator and screen. The great advantage it has is that it may be set to crush from full size of feed openings down, giving a product varying from about three-eighths inches to sand, if the material is clean and dry, being very valuable in preparing work or ore for stamps, rollers or any other machinery for reducing it to an impalpable powder. It has also a great advantage in the large range of work it will do, from coarse to fine without changing feed or concaves.

When the material to be crushed is clean and dry and discharged freely, the head of the smaller sized crusher can be set up to within three-eighths inch of the concaves, and by means of the lower level on the head all the

## The Great North.

We have been accustomed to speak of the "Great West" of this continent as the only portion promising any special value for undeveloped commercial or agricultural purposes. The northern portion has never received that consideration to which it is justly entitled. Alaska, until quite recently, was considered utterly worthless and a dear purchase by our Government for its cost, \$7,000,000. But gradually its resources are becoming better and better known. Its fur products, its fisheries, its lumber possibilities, and its mines are each a source of immense wealth, and either will well repay the purchase money. More recent reports describe its southern portion as quite an inviting field for agriculture.

Our success in that direction seems to have inspired the English Government with the idea of looking also to the prospective value of their possessions in the interior portions of this region. The interest already manifested in Manitoba is well known. Quite recently a parliamentary committee, which has been appointed to inquire into the resources of the Great Mackenzie basin, have reported that the extent of the region is 1,260,000 square miles; that its coast line on the Arctic ocean and Hudson bay measures 5000 miles, over one-half of it being equally accessible to whaling and sealing craft; that the navigable coast lines of the larger lakes of the region extend for 4000 miles; that river navigation is practicable for 2750 miles; that within the region there is a possible area of 656,000 square miles fit for potato growing, 407,000 suitable for the cultivation of barley and 316,000 for that of wheat; that the pastoral area is equal to 800,000 square miles; that 150,000 square miles are auriferous, and that the evidence submitted to the committee points to the existence in the Athabasca and Mackenzie valleys of the most extensive petroleum field on the American continent, if not in the world.

They report that they have reason to believe that a comparison of the capabilities of this region shows that it exceeds, in the extent of its navigable waters, in the area of arable and pastoral lands, in valuable fresh-water fisheries, in its forests, and in its capacity to support population, the countries of Norway, Sweden, Denmark, Germany, Austria and part of France and Russia. The committee recommend protection for the whale fisheries in the Arctic ocean. The fur-bearing animals of the region are also reported on.

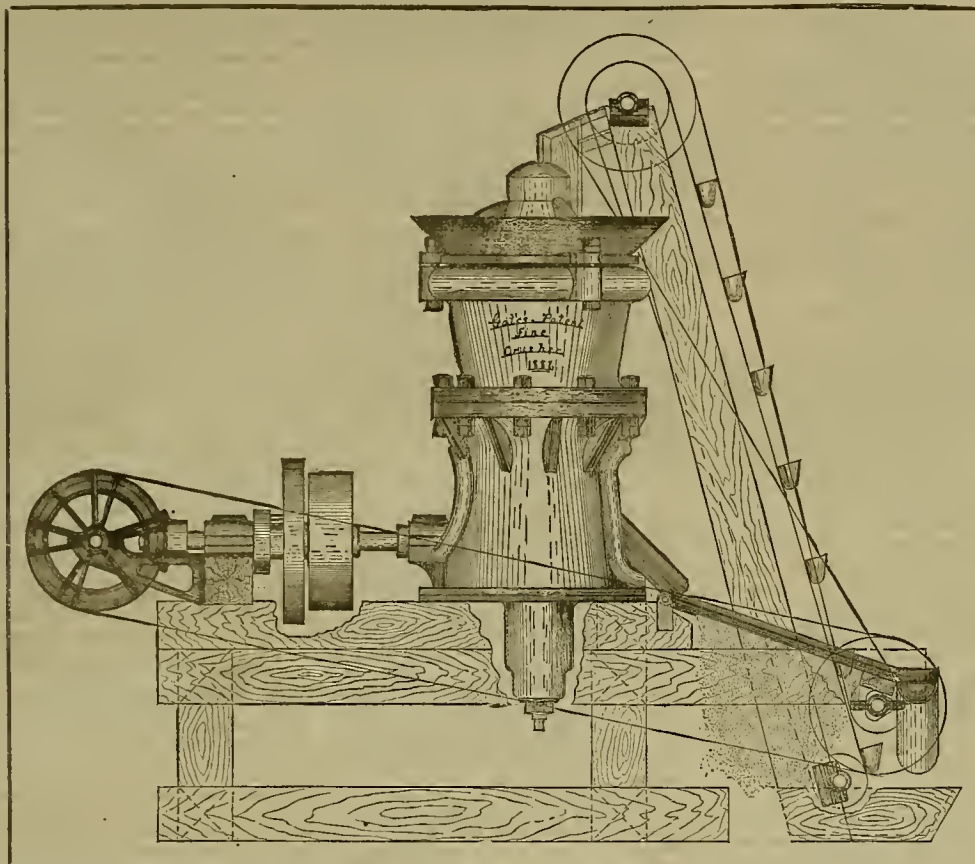
## Electricity as a Motive Power.

We often hear electricity spoken of as a motive power, and the prediction is freely made that it will soon take the place of the steam engine; that it will be employed to propel vessels across the Atlantic and the like. But such a view of the matter is wholly without scientific basis.

Electricity, in its general application to machinery, is never in itself a source of power. It is merely a convenient and easily manageable form of energy, by which mechanical power is transferable from an ordinary prime motor, as a steam engine or a water-wheel, to a secondary motor which is employed to do the work. It performs an office precisely analogous to that of a belt or line of shafting which, however useful in conveying power from one point to another, can, under no conceivable circumstance, be capable of originating it.

When electric motors were first offered to the public a few years ago, but little confidence was placed in them. But since that time they have been much improved in construction, until now the electric motor may be considered as nearly perfected. It has less parts, is less liable to accident, is more easily repaired, runs at more even speed (if so desired) than any other form of prime mover. It develops power with less weight per horse-power than any other. The time is not far distant when small steam, hot air and gas engines will be very generally replaced, at least in cities and large towns by electric motors.

Until some plan can be devised to obtain electricity direct from the burning of coal or oil, the steam engine will continue to be "the great prime motor." This is not saying that electric motors will not come more and more generally into use, but the steam engine will lose nothing of its prestige, and steam-engine



THE GATES COMBINED COARSE AND FINE ORE CRUSHER.

and working it; yet operations were continued, the perseverance of Superintendent Preston having finally been rewarded by the opening up of a new and better chute of ore. This new find, which occurred on the ninth level, pays at the rate of six dollars per ton, and promises to prove permanent. That it will do so is much to be hoped, as even the temporary suspension of operations in a great mine like this, would prove a serious misfortune, not only to the company and their employees, but also to the business community where the property is situated.

In order to avoid shutting down, the general manager, Wm. Johns, was forced to take some chances as well as practice extreme economy, as even in such emergency no aid could be expected from the directors in London, and of this he was well advised. Yet his business sense and long experience as a miner, indicated the proper course to be pursued. That it has led to such fortunate results is matter for general congratulation; nor is it probable the company will ever again be reduced to like straits.

In so resolving to drive ahead during this season of borasco, Manager Johns has set an example that other mining companies would, under similar circumstances, do well to follow.

The Chollar folks are running about 200 feet of blanket sluice and saving some of the tailings. They will doubtless build others in the near future.

greatly decreases the force of the currents so that ore particles which have been swept from the two tables will deposit and can be treated under conditions which favor their separation from barren matter.

This outside curve, therefore, does the finishing or tailings work in a direct and simple manner without the intervention of more or less complicated mechanism, because the buddles or tables perform the office of feeders, distributors, deadheads, etc.

As the cone remains stationary, the point or section of discharge for any assumed product travels around the periphery. For this reason one of the arms of the lower table is extended beyond the periphery of the cone and carries at the end a trough, the purpose of which is to bridge the circular sluice so that the concentrated product from the cone can be delivered into the tank. The barren tailings drop into a sluice and are carried away.

THE Columbia School of Mines faculty are about to appoint an examiner in Salt Lake of applicants for admission to the school, so that candidates can ascertain without going to New York whether or no they are qualified to enter.

TROUBLE with the miners at Newcastle, W.T., resulted in the indefinite shutting down of the mines by the order of Superintendent Miln, of the Oregon Improvement Company.

coarser pieces are crushed several times before they can get out, thus allowing nothing larger than three-eighths inch to pass through. When the return elevator and a screen are used, a great deal finer product can be obtained, according to the nature of the screen used. The Pacific Iron Works of this city has the agency.

A PATENT FURNACE CASE.—Daniel Meyer, M. G. Rhodes and the Aetna Quicksilver Mining Company have for a long time been using a patent furnace invented and owned by R. F. Knox and Joseph Osborne. The inventors brought suit against Meyer et al. in the United States Circuit Court, and Judge Sawyer has decided in favor of Knox and Osborne, and Master in Chancery Houghton will assess the amount of damages due the inventors. The defendants are restrained from making any further use of the furnace.

COMPLETE returns of the bullion product of the Hale & Norcross mine during the month of April have just been received. The delay in securing these returns is owing to the shipment of the bullion to the Carson mint, where it is parted and the gold portion is sent back to the mine to pay expenses while the silver is sent to this city to be sold. There is an important saving in exchange by this means. The total product of the Hale & Norcross mine in April was \$133,467.76, of which \$64,038.86 was gold and \$69,428.90 was silver.



builders may confidently console themselves with the fact that their calling will never retrograde in importance until electricity direct from coal has assumed a practical form.

#### New Uses for the Wire Cable.

A wire cable, for the propulsion of cars for short distances, with the cable above ground, has been in use, to a limited extent, for many years, both in this country and in Europe. It has been used in Scotland for over 20 years to haul ore from mines. But it is only since the improved use of the wire underground, first applied to street traffic in this city, has become generally known, that any very general attention has been called to the value of such a mode of propulsion.

The wire cable both above and underground is now coming into very general use in Europe for short-distance hauling. It is said that one of the chief reasons why the Spanish iron ore can be shipped so cheaply to this country lies in the fact that by the use of lines of this system from their large open cut mines to the wharves where the steamers lie, practically no handling of the ores takes place, and consequently the cost of transportation is reduced to a minimum. The figures from the manager of one of the tramways operating in the Saarbrücken coal district, Germany, show that the cost of transportation is only 54-100 cent per ton per mile. The length of this line is about four miles, and it is carrying 1000 tons of coal per day.

It is said that a single firm in Germany, Bleichert & Co., have already erected 350 lines of their system alone, while a large number of additional lines have been put up by other builders.

Some idea of the extent to which these roads are being built can be obtained from the German Government mining statistics, which show that for each of the last three years the amount of wire cable used for the construction of cable roads alone was one-third more by weight than the whole amount of wire rope consumed in every other department of mining throughout the country.

Its application of the underground cable as a means of transporting freight between interior districts and the cities will probably ensue. In nearly all the countries of Europe special laws have been promulgated, regulating not only the construction, but also the running of these cable roads. In fact, they have become one of the regularly acknowledged means of communication in all sections of the country, whether either natural difficulties presented by the contour of the ground to be traversed would render the construction of surface roads either too costly or altogether impracticable; or where, on the other hand, the service required is less than enough to keep the rolling stock and personnel of a surface railroad fully employed.

If such results can be obtained in Germany, ought not our engineers be able to make a more general application of either underground or surface cables in this country? The problem of cheap transportation over short distances of, say from 3 to 8 or 10 miles, is one which, once solved, will enable hundreds of mines, quarries or factories to be successfully operated, which, without such facilities, would be practically unprofitable or never be brought into existence.

A DISPATCH from Nogales, Arizona, says: Quite a flurry has been created in mining circles by a rich silver discovery in the foothills of the Pajarito mountains, 10 miles west of Nogales. Experts who have visited the locality say that it is one of the richest silver discoveries ever made in Arizona. The ore assays from \$400 to \$5000 to the ton. Great quantities of malleable ore have been picked out of the ledge. Several shafts have already been started and a large area of ground has been located. An abundance of water is found in the immediate vicinity.

SOME 4000 feet of 10 and 8-inch high-pressure water pipe from the combination hydraulic pumps will be placed in the Chollar shaft, on the Comstock, and will be used to drive Pelton wheels at the bottom of the shaft to run dynamos, from which the energy will be transmitted to the Nevada mill and to the surface for local use. They are in sections eight feet in length, and weigh about 1200 and 1500 pounds each, the whole aggregating nearly 400 tons. It takes over 500 sections to reach the bottom of the shaft. There will be two columns set, one of each size.

#### Progress of Oil and Gas Fuel.

Oil and gas is steadily making its way into general use in this country. Especially is this the case in our great iron works. The quite recent past has witnessed some important successes in this direction. Notably we refer to the Union Steel Works in Chicago, which institution has fitted up its entire plant of boilers and furnaces for the purpose of burning oil. These works now consume 1200 barrels of oil a day. The Cleveland Rolling-Mill Company is now using from eight to ten carloads of oil a day, and the famous De Pauw's American Plate Glass Works at New Albany, Ind.; the Studebaker Bros. Manufacturing Co. at South Bend, Ind., the great Thread and Flaming Mills of Flint, Mich., and many other lesser establishments have done the same thing.

Eastern manufacturers have not been slow to recognize the merits of oil fuel, and among those who have gone to using it are the Worcester Steel Company and the Wabash-Moen Manufacturing Co. of Worcester, Mass., and Allen Bros., manufacturers of wall paper, at Sandy Hill, N. Y., and now comes the information that negotiations are pending for the introduction of fuel oil into several manufacturing concerns in Philadelphia.

While this is being done by our Eastern manufacturers, the city Government of San Francisco is engaged in throwing hindrances in the way of similar improvements in this city on the score of unfavorable action of the oil on boilers and consequent danger, and all this in the face of high authority to the contrary. With coal at from \$12 to \$18 per ton, our manufacturers are virtually compelled to ignore or disguise a fuel which would be equivalent to coal at from \$4 to \$6.

#### Natural Gas Fuel.

While we are being thus cut off from the use of oil there is hope of ultimate relief from the use of natural gas which is being struck in various localities throughout the State. Should it be found in large quantities, such localities might become important centers of industry at the expense of this city. There are prospects that a good supply of natural gas may soon be developed in the Buttes, a few miles back of Sutter City, Sutter county. An old shaft was sunk to a depth of 40 feet a dozen or more years ago, by parties prospecting for coal and other minerals. They struck a strong flow of gas, and it was abandoned in consequence after an explosion had occurred which wrecked the windlass at the top of the shaft. Ever since the shaft has been giving out gas.

Gas is also found at numerous other places in the State, near Stockton, near Merced and in various places in the Southern portion of the State. There is good reason to believe that it may also be found in Alameda county and near this city. We understand that measures are in contemplation for a more thorough exploration for gas in several localities where it has been found in small quantities. Such explorations are greatly needed in view of the benefit to our industries that might be derived from success in that direction.

The use of natural gas in Pittsburg has proven of vast benefit to that city. It is not only enabling the iron manufacturers to turn out their goods at a less cost, but also of better quality. As an evidence of this we may remark that the *London Iron Monger* some time ago in referring to the introduction of some Pittsburg tools into the European market, appeared quite skeptical in regard to the success of the American manufacturers, but in its issue of March last it announces that Bagshaw Brothers of London, Paris and Brussels are acting as agents for Park Brothers of Pittsburg, and that the arrival of shipments of steel made by natural gas is now a confirmed fact. It is added that, "if it be true that the process of making steel by means of natural gas gives purity of flame and unexampled regularity of heat which no other kind of fuel can supply, this is perhaps a rather serious handicap for the British producer."

NEWSPAPERS IN 1888.—The last edition of Geo. P. Rowell & Co.'s "American Directory" fixes the number of newspapers and periodicals now published in the United States at a fraction over 16,000—a gain of \$90 during last year. In 1836, when the writer first entered the editorial field, the number of periodicals then published in the country did not exceed 900.

## SHOP NOTES.

#### Milling vs. Planing Machines.

There is quite a sharp controversy in progress in the columns of the *American Machinist* in regard to the relative merits of milling and planing machines. The *Machinist*, in alluding to the controversy, says:

There is a field for the milling machine, and there is also a field for the planer, each being better adapted to the work in its particular field than the other.

The comparative efficiency of milling machines and planers depends not only upon the character of the work, but upon how much of it is to be done, the limit of variation allowable, and last, but by no means least, upon the man who is to manage them.

Because a planer may be more efficient than a milling machine in a given shop, under certain conditions, and with certain management, is no positive proof that it will be so in every shop or under other conditions or management, any more than because (as one of our correspondents says) a feed of 1/64" is fine enough for cutting key-ways, 1 1/2" wide, on a 45" Sellers planer, therefore it is fine enough for any work on any size planer.

In some few machine shops it would probably pay to use milling machines entirely in place of planers, and there are other shops in which it would not pay to use them at all, but in the vast majority of shops, under intelligent management, it will pay to use both, each for its own appropriate work. This is not a mere theory, but is proven by actual shop experience. It is undoubtedly true, however, that the field which can profitably be covered by the milling machine is much more varied and extensive than has been generally believed, especially by those mechanics who have had only a very limited experience with them.

As tending to show the weight which the character of the work to be done must have in the choice of methods, we may mention a case coming under our observation. There were a lot of cold-rolled shafts about two feet long and two inches in diameter, which were to have a half-round groove cut in them from end to end, the groove being about 3/16 inch wide and half as deep. Now, if these grooves had been required to be very accurate as to dimensions and form, and to be left smooth and in good shape, it would have been a good job after the milling machine man's own heart; but this groove was only for an oil way, and the job was being done on a planer. The man had a sort of fork bolted in the middle of the planer bed over the T-slot, into which the ends of the shafts were pushed after being laid in the slot, and they were not fastened down in any way. The shaft passed under the tool once and the groove was finished, and while it was doing this, the man picked up another shaft and laid it on the planer bed beside the first one; during the back stroke, the shaft, which had just been grooved, was rolled out of the slot, and the other one rolled in, and at every stroke of the planer a shaft was grooved, the planer not being stopped at all. The rate was about five shafts per minute, and the temptation to rig up a milling machine for the job was quite small, even for the most enthusiastic milling machine man. Of course, the man who was running that planer was not a mechanic, and could not have done a fine job of planer work at all, but he was doing that particular job well enough for the purpose, and incidentally was demonstrating that for some work the planer was superior to the milling machine; but the same shop made use of many milling machines, and had that groove been of a different character it would have been milled, and milled better and faster than it could possibly have been planed.

Many such cases might be mentioned, going to show that the choice of a machine to do a certain job must be governed by the character of the job, and the decision should be made by a mechanic thoroughly familiar with both machines, and without prejudice for or against either of them.

REDUCING STEEL TUBES, ETC.—The editor of the *American Mechanic* recently paid a visit to the works of Billings & Spencer, of Hartford, Conn., where he witnessed a number of novelties in the way of "shop notes." He says: "We were shown some specimens of steel tubing, parts of which had been reduced in diameter under dies, the effect of the operation being somewhat remarkable. There seemed to be little or no tendency to lengthen the tube, when its diameter is reduced in this manner, but the surplus stock is taken up by the thickening of the reduced portion. One specimen was a piece of steel tube about three inches diameter, and six inches long, about four inches of which had been drawn down to about an inch in diameter, leaving a portion at each end the original size. Good shoulders were formed, not being over three degrees from square. We saw also a 'box' for a vehicle wheel, which had been made of a piece of welded steel tube reduced to the proper taper under dies, and flanged."

SAVING POWER.—When a shaft is to be loaded down with pulleys and strung up in every direction with belting, quite a saving in power can be made by giving some attention to the number of bearings that can be brought into use. A light shaft, with bearings close together, will

stand as much lateral displacing tendency as a heavy one with hangers few and far between. There is nothing lost by having a few extra bearings, as far as friction goes, if the foundation has got through settling and the frame from warping out of line, but the percentage in power keeps up wonderfully with the size of the shaft when an addition in this respect is made.

#### How to Sharpen a Plane Iron.

The simple art of sharpening a plane iron is supposed to be understood by every mechanic, remarks a writer in a contemporary, but there are hundreds of men who cannot do a creditable job in this respect. The common tendency is to round off the edge of the tool until it gets so stunted that under a part of the cutting the tool strikes the work back of the cutting edge. To do the job correctly, we will begin at the beginning and grind the tool properly. First, the kind of wood to be cut must be taken into consideration. Common white pine can best be worked with a very thin tool, ground down even to an angle of 30°, provided the make of the tool will allow it. Some planes will not, for the iron stands so "stunt," or nearly perpendicular, that its grinding causes a severe scraping action, which soon wears away the tool. In such cases from 45° to 60° is the proper angle for plane irons, and this, too, is about right for hard wood planing.

Determine the angle you want on the plane iron, and then grind to that angle, taking care to grind one flat bevel, and not work up a dozen facets. If the stone be small, say 12 inches to 18 inches in diameter, the bevel will be slightly concave like the side of a razor, and this is a quality highly prized by many good workmen. In grinding, take care to avoid a "feather edge." If the tool already possesses the right shape, grind carefully right up to this edge but not grinding it entirely off. The time to stop grinding a tool is just before the old bevel is all ground off.

Should the tool need any change of shape, such as the grinding out of a nick or a broken place, then put the edge of the tool against the stone, and bring the tool to the desired shape before touching the bevel.

Let the iron lay perfectly flat upon the stone, with a tendency only to bear harder upon the edge of the bevel than upon the heel. Move the iron back and forth on the stone as fast as your skill will allow, taking care that the heel of the bevel is not lifted from the stone. As you become proficient in whetting an iron, the heel may be lifted from the stone about the thickness of a sheet of paper, or just enough to prevent it from touching. The reason why many carpenters cannot set an edge is because they raise their hand too much, and perhaps rock the tool, thus forming a rounding bevel, the sure mark of a poor edge-setter.

The proper way to oil-stone a tool is to continue the grinding by rubbing on the oil-stone until the bevel level left by the grindstone is entirely moved, and the edge keen and sharp. If this be properly done, the tool need not be touched upon its face to the stone, but among a dozen good edge-setters not more than one can do it. It is a delicate operation, and can only be acquired by long practice. Nine times out of ten the average workman is obliged to turn the plane iron over and wet the face thereof, and here is where many men fail who have done the other things well. By raising the back of the tool only a very little the edge is "dubbed off," and regrinding of the face becomes an immediate necessity. A good stone should "set" an edge on a tool which will shave off the hair on a person's wrist, without cutting the skin or missing a single hair.

FORTY-THREE varieties of sewing machine shuttles have been made here; four of them for sewing-machine builders in England, who freely admit their superiority over anything in that line obtainable in England. The machinery and tools for making these shuttles and the bobbins are quite interesting to the mechanic, the latter being made entirely by automatic machinery. A good deal of the work is polished here, and as a protection from rust had been given a very light coating of vaseline. This is a new substance for that purpose and serves admirably, a light coating of it being colorless and scarcely perceptible, yet being an effectual and complete protection. After trying nearly everything else, they consider it the best, a fact which many of our readers will be glad to know. The smallest forging they are at present making is used on a type-writer and weighs one-sixteenth of an ounce. In the store-room, where the finished stock is kept, is an exhibit which, on account of its great variety and the elegance and finish of the articles, is quite interesting to the mechanic, especially when we consider that, notwithstanding the antiquity of the art of forging, this is all the product of an art which has been acquired within a comparatively few years, and has reached its highest development in this country.

COPPER CASTINGS.—The making of drop forging for electrical work out of pure copper has grown into an extensive business, and about five tons of copper per month are now used up at these works in making commutator bars and segments. Unalloyed copper is best for this purpose, but it had not been available because the bars were of such shape that it was considered necessary to cast at least a part of them, afterward brazing the parts together to form the complete bar. Since pure copper cannot be



cast, they are made of an alloy containing as much copper as would admit of its being cast. Mr. Billings happening into a shop where they were making commutator bars in this way, offered him a piece of a solid piece of pure copper—a proposition which nearly took the breath away from the Swedish electrician who was doing the work, but which, notwithstanding his skepticism, led to the present business of drop forging them, and the entire abandonment of the old method.

**KEEPING THE RUN OF THE STRENGTH OF BOLTS.**—As a general thing it takes as much, if not more, says a cotemporary, to shear a bolt off as it does to break one apart by using a direct pull, for all the shearing is supposed to take place in the body of the bolt where the cross-section is the largest, instead of taking advantage of the weaker portion just under the nut, down at the roots of the thread. The area here is more than a fourth less in cross-section, and stands a good chance to get an uneven strain by the load not resting fairly under the head. One of the best conveniences for keeping the run of the comparative strength of bolts is to become acquainted with a number of sizes to the amount of work they are able to stand, and from this gauge all others accordingly. A one-quarter inch bolt is good for 250 pounds, which it ought to be able to stand if it has any show at all. With one twice as large, all rules would make it out to sustain a load of one-half a ton, or four times the amount of the one-half inch size, when five times this strain would be safely provided for. A seven-sixteenth bolt or one-sixteenth less in diameter is amply large for a one-half ton strain. With these figures a workman should be able at a moment's thought to cut out an eye-bolt that has some reference to the work at hand, if it is nothing more than to hoist a load into the second floor of an establishment.

**POWER IN THE SMALL SHOP.**—All mechanics should be interested in such matters as power and machinery in shops for ordinary job work. There is always economy in substituting power for hand work wherever it can be done. Even in the very small shop power is more than an equivalent for an extra hand. A shop where any large amount of work is done should have, if possible, a circular saw, a band saw, a Daniels, a side-wheel planer, a rounding and a polishing machine, a turning lathe, and a mortising machine. They are all inexpensive. They economize labor and improve the quality of work. The cost of running them is but a trifle, if you are where power can be had. Moreover, by having such machinery, business is increased by being able to secure jobs that cannot be obtained where there is nothing but hand work. In these days of sharp competition men with small shops need all the help that machinery can give them.

## OUR LUMBER INTERESTS.

### High-Priced Lumber.

The present high price of lumber is set forth by the people of the Southern part of the State as a great hindrance to the growth of towns in the Southern counties. The San Diego Sun, of May 18th, says: "Although the property-owners and contractors and builders are not in open warfare with the different lumber companies in this city, yet such seems imminent, as the complaint against the lumbermen is loud and bitter. It seems that the cause of the trouble is due to the action of the lumber companies in maintaining the exorbitant prices that prevailed eight months ago when material was scarce and the demand enormous. From careful inquiries made yesterday it was learned that the number of property-owners who are delaying building because of the exorbitant prices asked for lumber can be reckoned by the score, hence the result is evident that the setback San Diego is receiving in the building line is only due to the greediness of the pooled lumber interests."

The Sun gives the names of quite a number of parties in San Bernardino who are anxious to build; but who will not do so at the present price of lumber. The high prices which have been so long maintained is evidently holding out inducements for the opening up of new fields of lumber supply, which must come in sharp competition with our present sources of supply.

It has been stated as a fact that a heavy syndicate of Texas lumber men have made arrangements with the Southern Pacific Railroad whereby they can put lumber in our yards at 35 per cent less than present prices. The lumber is the celebrated yellow pine of Texas and Louisiana.

A cotemporary doubts the practicability of the scheme. It can be done, however, if the railroad will make rates low enough. But will they? If they will, it will stimulate building and be the cause of again starting a building

boom which has been greatly retarded, both by high prices and also by the practical impossibility of getting lumber at all.

It is also stated that a syndicate of California capitalists has been formed to take up 400,000 acres of land in New Mexico, much of which is covered with pine timber, build sawmills, and construct a branch railroad 30 miles long to connect the mills with the Southern Pacific road. If the timber on this tract is of good quality and easily accessible, this will probably be the readiest way of providing lumber for the southern portion of the State. The activity in the building interest which is now setting in in the central and northern portions of California, will soon absorb all the lumber which can be produced on Puget sound and other portions of our northern coast, and in the Sierras as well. There is already an urgent need for the opening up of new lumber regions to supply the rapidly growing demands for that indispensable requisite for the rapidly growing population of this coast.

### Redwood Stumps and Roots.

Redwood is now being largely used in the manufacture of furniture. For certain pieces of furniture redwood could not be surpassed in beauty by any other wood, provided a man understands the finishing of the same to perfection.

It should be finished so as to retain its natural color. Experts who have been working for many years in redwood say, that in the finishing, to have it done well and quick, also to have it retain its natural color, a somewhat different manipulation is required than by finishing other woods intended for fine work. To use fillers, such as corn-starch, whitening, etc., is unnecessary, for redwood has no pores to be filled.

An expert writing to the *Architect* of this city, says: "I have a compound and a way of doing the work to perfection, different from any other process now in use. By my finish redwood is as smooth as glass, the figures of the wood are brought out distinct, whether to be finished in bright natural color or in imitation of rosewood, walnut, mahogany or other kinds. I use mostly such redwood as is rejected by carpenters, or has hitherto been used very little. I use the stumps and roots, which have always been a nuisance to farmers, and which they (the farmers) are glad to get rid of; such stumps, after the timber is cut, are in general left standing, with the expectation that they will rot in course of time, but none have found out yet how long that will take, for I have recently used the wood from stumps of which the trees had been cut down 22 years. The stumps were partly burned, and after digging them out I found the inside portion fresh, green and solid. The wood, after being cut in proper shape, now is most beautiful. The diameter of such stumps is often enormous. By proper means and manipulation such stumps can be made to bring more money than the price of the land and the value of timber that has been cut from them. There are fortunes to be made in this point, more reliable than a gold mine."

This expert works up slabs and stumps into fine furniture, panel-work, picture frames, etc., and finishes them in any shade or color which may be desired. The stumps however, make the finest work.

### The Evils of Tariff Tinkering.

The protest against the removal of the duty on lumber which the lumber firms of the Pacific Coast have sent to our representatives in Congress serves at once to show how intimately one branch of business is allied to another under our protective system, and the injustice of picking out one particular branch to experiment upon. The lumber firms say that if the duty is taken off of lumber they will demand that restrictions which make the cost of producing lumber greater in the United States, than in Canada, be removed. The duty on iron, sugar, cordage, and other things, that tends to increase the cost of manufacturing lumber, should, they claim, in justice to the lumber interest, be repealed. It is not easy to see how this demand is to be answered. Why create an artificial price for the things the lumbermen consume, and place their product in the market at the natural price in the place of cheapest production? Canada has inexhaustible stores of this raw material. It imports coolie labor to convert this raw material into lumber, and subsidizes railroads which transport it to the American market at a nominal charge. We now equalize the cost of production in the two countries by placing a tax on foreign lumber, but the free-traders declare that the duty must be taken off. The matter of labor alone requires that the American lumber business be protected. We refuse to allow American lumber firms to import Chinese labor, but our authority, of course does not extend to Canadian competition. The latter may import Chinese under contract at \$50 a head, and use their labor to flood the American market with lumber. In this way we receive the product of Chinese labor while excluding the laborer himself. The lumber interest is a good one to make a stand upon. If it is the American policy to exclude coolie labor it should also be the American pol-

icy to so tax the product of coolie labor in other countries that it will not come in direct competition with American labor.—*Exchange*.

**ENORMOUS GROWTH OF THE LUMBER BUSINESS.**—Reliable statistics assure us that in 1860 the entire lumber product of Wisconsin, Michigan and Minnesota was 1,600,000,000 feet; in 1887 it was 7,500,000,000 feet, or nearly five times as much. The result of this enormous increase of production has been to advance pine lands in those States from \$1.25 per acre, and in some instances to \$75 an acre, which means an average value of \$4 per 1000 feet of lumber in the trees. That is the condition of things today in those three States. Meanwhile the consumption has gradually reduced the stock of uncut pine until it is now estimated at from 100,000,000,000 to 140,000,000,000 feet, the latter figure being the outside limit, or a supply for 20 years at the present rate of consumption. The steady consumption renders it certain that a new field must be sought by those wishing to invest capital in pine timber. Attention is therefore turned to the pine lands of the South. Although of a different quality, the pine of the South can be used for every purpose for which the white pine of the North is used to-day, and it is equally as convenient to market. In fact, it is the only pine available for the future except that on the Pacific Slope. Reliable estimates place the amount of pine timber in the South, from Florida to Texas, at 240,000,000,000 feet. This amount, with its natural growth before it will become exhausted, will probably reach 400,000,000,000 feet. The timber resources of the South should be an immense source of wealth to that region; but, unfortunately, the people of the South are allowing the lumbermen of the Northwest to gobble it up from them at the mere pittance for which such lands are now selling. Hundreds, and probably thousands, of square miles of this timber region has already passed into the hands of Northern capitalists.

**HUMBOLDT TIMBER LANDS NOT TO BE SURVEYED.**—A large number of Humboldt county residents petitioned the General Land Office at Washington some months ago to have surveys made of lands in that county containing redwood timber, to give them an opportunity to file on the land and ultimately purchase it. A few days since Surveyor-General Hammond received a letter from Commissioner Stocklager on the subject, stating that the surveys could not be made, that the existing regulations prohibit the survey of forests, and that expenditures must be restricted to the survey of agricultural lands. He concluded his communication by stating that the granting of the petition would nullify existing surveying instructions and establish a bad precedent.

The managers of the Hesperia colony, San Bernardino county, have contracted for 1,000,000 feet of lumber for building purposes. They intend to spend \$500,000 in bringing water to their 30,000 acre tract.

**SHINGLES FOR CHICAGO** is the latest business wrinkle in the business of Puget Sound; 120,000 fancy shingles recently went forward in one order.

**WORKMEN** are putting in on an average 15 sections of water-pipe daily in the Chollar incline for the electric system of transmission of power. There are about 500 sections to put down to complete the job. As the surface of the shaft is neared, quicker work will be done. All the clamps and bolts are about manufactured, and the carpenter shop is turning out the framed timbers as fast as they can be handled. The blacksmith force has been worked far into each night to turn out necessary material, but they can now take a breathing spell, as they are ahead of the work. The order has been to work every department to its fullest capacity, and it has been strictly obeyed. The Chollar shaft is now the busiest hive on the Comstock lode. The electric plant is expected in a few days, and everything in the shaft will be completed at about one and the same time. At the mill there is a strong force at work, framing the timbers for the additional battery of 20 stamps. It is worth one's time to see the massive timbers used. Only one timber can be cut from the largest trees—what is known as the butt log.

The electric machinery for the Big Bend Tunnel Company, Butte county, comprises two dynamos, 12 motors, 50,000 pounds of copper wire and a large lot of different kinds of machinery. The dynamos have a capacity of 140-horse power, and the motors five-horse power each. There are two lines of copper wire, one seven miles and the other ten, and as each is double this makes about 34 miles of wire. The electric power will be used to run the pumps and derricks. The plant was furnished by the Sprague Electric Railway and Motor Co. of New York. A force of men is now engaged in getting everything ready for the immense plant. Three hundred inches of water with a fall of 300 feet to the Pelton water-wheels will furnish the necessary power to run the dynamos.

**NOTWITHSTANDING** the alleged scarcity of water, the Boca Mill Company near Truckee, has completed the most successful log drive that has been made by them for many years. The pond is estimated to contain nearly six million feet of saw timber.

## COTTON AND WOOL.

### Asiatic Cotton Competition.

Much interest is being manifested relative to the possibility that cotton culture in the United States may soon meet with unwelcome competition in the production of this important staple in northwestern Asia. Quite extensive experiments in cotton culture have been made, under British encouragements, in Egypt and Central Asia; but the latest and perhaps most successful efforts have more recently been attempted under the patronage of the Russian Government in Turkestan—the Russian Asiatic province on the northeastern shore of the Caspian Sea.

In regard to these experiments, an Eastern cotemporary says: "Russia is aspiring to be numbered among the cotton-growing countries of the world, and has already in the neighborhood of the Caucasus range produced a sufficient quantity of the staple to attract attention from those cognizant of what is going on in a locality not likely to be generally associated with the growth of the fibrous plant. The enterprise has been in the hands of large moneyed concerns, freely supported by government assistance, and pushed with a quiet but determined energy that at last appears likely to attain the desired success." Our consuls have noted the same thing, and many optimistic views have been expressed concerning the future of these efforts.

But what is here said regarding Caucasus, is said more emphatically about Turkestan, where the chief hopes of the Russian Government are now centered. This territory is now being opened up and brought into direct commercial relations by rail with the general system of Russian railways. It is the point in Russian Asia to which the attention of the world is just now being attracted, in connection with great military preparation and railroad activity. The southern portion of this province is in the same latitude with North Carolina; but the difference in the climate of the two sections would place it, relatively, within the latitude of our best cotton-producing States. Just south of the Russian line is found the magnificent valley in which Herat is situated, and which but a short time since was so actively threatened with Russian troops as to call forth active military demonstration by England. With this valley in her possession, Russia would occupy a most important vantage ground.

The *Boston Journal of Commerce* says: "The development of Central Asia, or such parts as lie within the valleys of its great rivers, into an agricultural district, is a momentous undertaking requiring more than the skill of the engineer to bring to a fruitful issue. The people of the country, that are native to the soil, must be either supplanted by a more progressive race, of a higher civilization, or brought up to a level of equal intelligence and enterprise. More than all of this, it has not yet been satisfactorily demonstrated that the climatic and other natural conditions of Turkestan are as suitable to those in the United States for the highest results in cotton culture. We have serious doubts if these conditions do exist to an equal extent. Certain it is that very extensive schemes of irrigation will have to be inaugurated and become familiar adjuncts in cotton culture, before any great results can be accomplished. None of these artificial methods for improving the productiveness of the land are called for in this country, and the expense attending them is saved. There is the climate, which must stand unchanged regardless of human efforts, and in it are to be found the chief elements for final success. Has Turkestan got it, in the same perfection as characterizes the climate of our own Southern States? There are those who are willing to testify that it has, but India has had for many years equally enthusiastic advocates, yet trials and experiments have never fulfilled expectations, even in the Dharwar district, which has always been regarded as the garden spot of India for the best results in cotton culture."

Every effort that has been attempted on Asiatic soil has failed in attaining the perfection so dominant in American cotton. American seeds have been planted and cultivated, time and again, with the greatest care and under the best attainable conditions, in India and Turkestan, and invariably have the results scoffed at the efforts. The first year would show a deterioration in the quality of the production, and a few seasons would efface nearly all the original characteristics of the seeds. Correspondents speak of the Asiatic grade equaling our middling and good middling. This may be all true, but it is apt to be misleading, as the grade is more the result of careful cleaning on ginning than anything affecting the quality of staple. We have seen many samples of Americanized Asiatic cotton, of the



first year's and and after year's growth, and it required no experienced eye to discern the decadence in spinning qualities."

Some of our Southern cotemporaries are evidently much alarmed at the situation. The *Atlanta Constitution* informs its readers that they "may well prepare to meet very formidable competition in India, in Asia, and in Africa." Further than this, it says: "There is another source of competition that the South will have reason to fear before very long. This competition will come from the Central Asian provinces of Russia. The cotton raised in Turkestan is practically American cotton. It is raised from American seed, and is said to have a fibre equal to the cotton that is grown in the South. The fact was noted only a few weeks ago that a Russian agent was going through the South buying the finest varieties of cotton seed, and this, together with the fact that Turkestan is already raising as marketable an article of cotton as can be grown in the South."

A limited amount of cotton is already raised in Turkestan, according to the rude methods in vogue among the natives. It is said, on most excellent English authority, that the cultivation of cotton in this Russian province is rapidly extending, reaching, in 1886, 32,000 acres. But even under the most favorable circumstances, Turkestan will require years of patient toil and European enterprise before it can assume to be on the high road of success in the cultivation of cotton. It is a question if Russia will be able to accomplish its purpose of inspiring new vigor in the dull make-up of the native population. By the time Turkestan has all her arable land devoted to cotton, should that time ever come, there will be a legitimate demand for her product, in addition to any probable gain in the American production. In the course of a few years the demand will require new fields for cotton culture.

### Revival of a Home Industry.

Some 50 years ago, most of the farm-houses New England were manufacturing centers; most of the woolen goods for every-day wear being made in the home. Cover-lids and blankets were also made from the wool of the sheep raised on the farm. The wool was carded, spun, woven and dyed, producing fabrics often of quite fine texture and always of very superior wearing capacity. Until recently, the writer was in possession of a blanket, which had been handed down from his grandfather, by whose hands it was woven, and which had stood almost constant wear for fully 50 years. No blanket could be bought to-day, for any price, which would stand the wear that the one in question endured.

To-day, people who are fortunate enough to possess one of these cover-lids of especially fine texture and colors, and of good pattern, are using them for ornamental draperies for the window or for portieres.

An effort is now being made in some parts of the Eastern States to revive this industry, in order to give to woman and children work at home, and, to use the expression of a cotemporary, to produce for the women of the North what the women of the South have already secured—a textile which shall reflect the color and design peculiar to the locality, for this local color is an especial charm when developed by skillful workers, as has recently been done. Goods of this character are already beginning to appear in small quantities; and with the help of art design it is hoped that before long we shall be able to meet the demand for New England textiles which has been made since the goods were first shown. Some of the later textiles, those woven 30 years ago, show more brilliant color and lighter weight. A very fine pattern is of flowers thrown into relief upon a deep brown background. The possibilities which lie in this New England textile seem to promise a revival of art industry for the Eastern States.

THE OREGON WOOL CROP promises a good yield—this with fine quality. Late advices to the *Call* of this city say that sheep-shearing is actively progressing in Eastern Oregon, and wool is already being hauled to points on the railroad. The clip being hauled to Arlington and the The Dalles is in fair condition. The staple is better than last year, except from localities where the ranges are crowded. Umatilla and Snake river wools are average in appearance. Union and Baker counties show a heavier clip, owing to the introduction of better blood. Grant county wools are light, and, on

the whole, the clip of Oregon may be considered five per cent heavier in shrinkage than last year, but wools classed as railroad wools by the trade are as much as 10 per cent heavier. There is no buying to speak of, except at Arlington, where Eastern speculators are operating to a small extent at full prices. There seems to be a tendency among wool-growers to accept current prices, but buyers are not at hand. The leading grading-houses of the city have orders to the extent of several million pounds to be filled, but not till something more definite is learned in regard to the Mill's Tariff Bill.

**FASHIONED GOODS.**—Fully one-third of the "articles worn by men, women and children," to follow the language of the tariff statistics, are now made by the use of fashioning and finishing machinery—mostly some kinds of knitting machinery; and in the forms actually worn, as distinguished from cloth made in the "piece," it cannot be doubted that this is a great economy, and that the most material saving of labor is effected by this change. An increasing proportion of articles, like the cardigan jacket for men, and the popular jerseys for women, is constantly called for. They were never so acceptable to the popular use as they are now, because they are fit for immediate use, and cost no more than the materials of which the like garments in cloth would cost, saving delay, and also the cost of the making, increased in the use of cloth garments. The knit goods industry represents a double progress, therefore, and it is a subject of interest with those who seek the attainment of social economics, as well as with the proprietors and persons employed, who have found it a safe and attractive department of business.

## Flour Mill Notes.

### Wheat Production and Export.

It is a necessity with free-trade advocates to show that the American wheat-grower depends upon the foreign market for the sale of his wheat. While it is true that we still send some wheat to Europe, it is also true that low prices in Liverpool and increasing demand at home are making the foreign market each year of less consequence to us. Within the last eight years the production of wheat has fallen off, and the proportion of that exported to the entire product has fallen off more rapidly. The following table shows the production and the exports for each of the last eight years:

	Production. Bushels.	Exports. Bushels.
1880.....	403,549,863	144,483,207
1881.....	383,080,050	120,451,388
1882.....	502,798,600	110,343,185
1883.....	421,189,100	70,143,289
1884.....	512,763,000	21,523,473
1885.....	357,112,000	53,628,000
1886.....	457,218,000	89,204,387
1887.....	476,229,000	95,128,641

It will be seen by this table that instead of increasing the production to meet the home demand from growth of population the increase in consumption is taken from exports.

It will be seen from the above table that the production of wheat decreases, actually as well as relatively. The product for 1887 was 50,000,000 less than for 1880, and the prospect for 1888 is that the product will fall short of that of 1887.

The report of the Commissioner of Agriculture for 1886 says that there is an increase in the wheat area of Europe, India, South America and Australia, and that there is no correspondingly growing market. The supply of Europe, leaving Great Britain out, is equal to seven-eighths of its consumption, besides seed. A few million bushels supplies Europe after the interior distribution is effected. The report sums up: "In other words, the world is striving to deluge Liverpool with wheat, and finds elsewhere, and is likely to find elsewhere, despite any law except the natural law of production and self-preservation, no markets that are worth striving for or that can enrich any wheat-growing nations." The free-trade advocates advise the American wheat-grower to depend upon this Liverpool market which the whole world is striving to supply. Under our protective policy the home consumption is rapidly growing upon home production. The foreign market is ours only when we can sell as cheaply as India, Russia or South America, while the home market is entirely our own. If no unwise legislation turns our industrial forces from manufacturing to agriculture, the proportion of wheat we shall send abroad will be less from year to year. This home market is one our farmer can depend upon. If the competition for the small English market should reduce prices below the cost of production in the United States, the tariff tax on wheat will secure the home market for our wheat-growers. It seems hardly worth while for the United States, which is importing annually from \$300,000,000 to \$400,000,000 of goods it might manufacture, to enter upon a policy which will depress its manufactures in the hope to make up the loss from increased sale of wheat in Europe.

**AMERICAN WHEAT IN ENGLAND.**—The *Providence Journal* says that the little dispute between Edward Atkinson and some English economists as to the ability of United States producers to deliver wheat in the Liverpool market at the low prices which are likely to prevail, is a matter of considerable importance to us, in view of the fact that sooner or later

we shall be forced into rivalry with India as a wheat-producing country. Mr. Atkinson's original contention was that the American farmer could make as much profit to-day on wheat at 34 shillings per quarter in Liverpool as he could when it was at 50 shillings per quarter in 1873. Naturally enough, several English critics denied this assertion. But Mr. Atkinson now brings forward figures to show that by the cheapened cost of production and transportation American wheat can be put down in the Liverpool market even as low as 28 shillings per quarter, and still be as profitable to the farmer as it was when the price was 50 shillings. The figures derived from recognized authorities certainly seem to be unimpeachable, and must be regarded as proving Mr. Atkinson's case. The fact throws light on the large reduction in railway and steamship charges that the last 15 years have witnessed. It still further postpones, too, the time when India can drive us out of the European wheat market.

**A NEW COMPETITION IN WHEAT.**—J. W. Nightengale, a member of the New York Produce Exchange, recently exhibited to that body a sample of wheat which had been grown at the Cape of Good Hope, from American seed, known as No. 1 hard Duluth. A part of the crop of the growth was sold in the London market last week at four cents cheaper than a similar quality of wheat could be bought in this country. All this goes to show that the Cape of Good Hope is in the field as a competitor in the wheat market of the world, and that American wheat prospers extremely well there.

**MEETING OF REPRESENTATIVES OF THE LEADING EASTERN FLOUR-MILLERS.**—Twenty representatives of the large exporting flour-mills of the various cities met in Chicago on the 15th of May at the call of President Seignett of the National Millers' Association to correct abuses of the foreign and domestic trade. It was proposed that two bureaus be established, one to take charge of the export trade and the other the domestic trade, the bureaus to be under the direct management of the National Association's Executive Committee. The proposition was adopted.

THE MINNEAPOLIS FLOURING MILLS are turning out larger quantities of flour than ever before. The product of March, added to that of the 52 outside mills, made an aggregate product of 931,352 barrels, against 834,215 barrels for the same month in 1887.

## THE WOOD WORKER.

### Staining Wood.

The following are receipts for staining wood, which are said to be used in a large establishment on the continent with great success:

**Light Walnut.**—Dissolve 3 oz. permanganate of potash in six pints of water, and paint the wood twice with the solution. After the solution has been left on the wood for from five to ten minutes, the wood is rinsed, dried, oiled and finally polished.

**Light Mahogany.**—One oz. finely-cut alkanet root, 2 oz. powdered aloes, and 2 oz. powdered dragon's blood are digested with 26 oz. of strong spirits of wine in a corked bottle, and left in a moderately warm place four days. The solution is then filtered off, and the clear filtrate is ready for use. The wood which is to be stained is first passed through nitric acid, then dried, painted over with the alcoholic extract, dried, oiled and polished.

**Dark Walnut.**—Three oz. permanganate of potash are dissolved in six pints of water, and the wood is painted twice with this solution. After five minutes the wood is washed and grained with acetate of iron (the ordinary iron liquor of the dyer), at 20° Tw. Dry, oil and polish as usual.

**Grey.**—One oz. nitrate of silver is dissolved in 45 oz. water, and the wood painted twice with the solution; afterward, the wood is submitted to the action of hydrochloric acid, and finally washed with ammonia. It is then dried in a dark place, oiled and polished. This is said to give remarkable good results on beech, pitch-pine and poplar.

**DENSITY OF AMERICAN WOODS.**—Of the 413 specimens of trees found in the United States, there are 16 species whose perfectly dry wood will sink in water. The heaviest of these is the black ironwood (*Condalia ferres*), of Southern Florida, which is more than 30 per cent heavier than water. Of the others, the heaviest known are the lignum vitae (*Guaiacum Sanctum*) and mangrove (*Rhizophora Mangle*). Another is a small oak (*Quercus grisea*), found in the mountains of Western Texas, Southern New Mexico and Arizona, and westward to the Colorado desert, at an elevation of 5000 to 10,000 feet. All the species in which the wood is heavier than water belong to semi-tropical Florida or the arid interior Pacific region.

**THE WHITE ASH.**—One of the most valuable of our native trees is the white ash, and, all things considered, it is one of the most profitable for planting. Combining lightness, strength, toughness, elasticity, and beauty of grain in a rare degree, it is in great and growing demand for farming tools, furniture, interior finishing of houses and railroad cars, the construction of carriages, for oars and pulley-blocks, and many other purposes. The excel-

lence of our ash is one secret of the preference given abroad to American agricultural implements. It is hardy, will bear the harshest exposure, is a rapid grower and attains large size, but will not thrive on poor lands. It is every way superior to the European ash, much as that has been cultivated and lauded abroad. It is now found widely in the nurseries and young plantations attached to the forest schools of Europe. Director General Adolfo Di Bsnanger, President of the Royal Instituto Forestale at Vallombrosa, says that it is the tree of which Americans may well be proud. The ash is a fine ornamental tree for private grounds, public parks, or for the way-side. When planted closely for timber they grow straight and free from low laterals, and early reach a size that makes the thinnings valuable for poles and fencing.

**THE WASTE OF WOOD-WORKING.**—There is an enormous amount of waste in wood-working. From the first stroke of the axe that fells the tree to the last touch of the tool that finishes the wooden article, each step witnesses the loss of some portion of the material. It is claimed by those who have studied the subject carefully that not more than 20 per cent of the tree comes into actual use, the other 80 going to waste. The waste, of course, includes the worthless limbs, twigs, slabs, knots, etc. This waste is certainly large and unfortunate, considering the growing scarcity of wood and the increasing demand for it; but there is some offset for this lugubrious view in the consideration of the fact that invention, care and discretion is constantly reducing this enormous waste.

## SAW MILL NOTES.

**A FLOATING SAWMILL.**—One of the greatest novelties of a practical character which ingenuity has devised is thus described by a Florida newspaper: J. L. Maull & Son have their mammoth floating sawmill anchored off the banks of Burton & Harrison's hammock. This structure is a marvelous piece of mechanical ingenuity, and was built by J. W. Maull and Edward N. Maull. It is 80x40 feet, and stands about five feet out of the water drawing only about 17 inches. It is solidly built, and according to the judgment of Mr. Carl, an old-time ship-builder, is capable of enduring the severe strains of even the waves of the ocean. The operation of all the machinery does not seem to move the vessel more than if it was on the land. It has so far proved more of success than its projector anticipated. It is equipped with a 40-horse power boiler and engine, with the latest improvements in saws and carriages. A planer, box-head and shingle-saws are all on deck and connected by shafting concealed under deck, so that the main deck is free from machines and available for the piling up of immense quantities of lumber. In one corner of the vessel is the cook house, where the hands board, while on the hurricane deck are the office and cabin of the proprietors and workmen. They are now so situated as to have command of an unlimited supply of the largest and finest timber, and from points heretofore practically inaccessible. A sawmill capable of moving up and down stream seeking a supply of logs and thus bringing the mill to the product instead of vice versa, may offer very valuable advantages, especially in the South.

**FASTER SAWMILLS.—SUGGESTIVE HINTS.**—J. R. McDonald is reported in the *Lumberman* as saying: "There is no mill on Puget Sound but what is conducted by the old Puget Sounders, but the Eastern men have revolutionized the method of logging on the sound, and they will make some very material changes in the method of milling before another year has passed. In our new mill at Point Defiance we are going to reduce the waste by kerf one-half, and we will put in saws with twice the number of teeth and we will run them with some respectable speed. Bless you, sir, in these mills now on the sound the managers seem content if their saws are run at the rate of five revolutions a minute. Our new saws will run ten times as fast as that." Mr. McDonald's words serve to emphasize a point that is quickly recognized by visitors from the East. It is frequently asked: "Where are all the Eastern lumbermen that come out to Puget Sound to invest in the lumber business?" The answer is always about like this: "Why, they secured some timber claims and are going to come out again in a few weeks." Most of these people get their timber land first. Some begin logging immediately, and soon it is expected that a number of good-sized mills will be put up and operated on the methods of men from the East.

**SAWING BY THE THOUSAND.**—In nearly all the mills which "saw by the thousand," says the *Wood-Worker*, lumber is not manufactured as it should be, and there is, moreover, much unnecessary waste. The interests of the millmen are naturally not those of the log-owner. The millman generally wishes to get as many thousand through his mill as possible, and he is not particular whether the lumber is well cut or not, or how much material goes to sawdust or mill wood which might be wrought into lumber. The log-owner is interested in getting as much good merchantable lumber out of his logs as possible, and he does not care particularly how long it takes to accomplish it, so long as he pays for the work by the thousand. Lumbermen who will take the pains to go to the



mills where the millmen for the most part on their own timber and job and retail their own lumber will have it demonstrated to them very quickly that better lumber is made in such mills.

**THE SAWDUST QUESTION.**—At last one Oregon sawmill is doing a good thing with its sawdust, a contract having just been made with a flour-mill close at hand for a supply of sawdust sufficient to keep the mill engine running, at a cost of \$50 per day. Even at this apparently exorbitant rate, the owners of the flour-mill cut their fuel bill in half, the present expense for this item being \$100. It is doubtful if any sawmill in the United States is doing as well with its hitherto despised dust, but it is a burning shame that millions of tons of sawdust go to waste every year in a country which needs cheap fuel about as badly as it needs anything. It is alleged that sawdust can be worked into a fuel equal to hard coal at a cost of one-fifth or perhaps one-tenth the average price to the consumer of coal, but neither inventors nor capitalists seem to have done their duty in making and placing upon the market such a fuel.

**THE MILLS OF PUGET SOUND** are all busy cutting lumber to supply the California market. They are working 11½ hours per day, the men being allowed an extra day's pay each week. There are now but few orders for foreign ports, and the advances in the price of lumber from Puget Sound over that of British Columbia has a tendency to divide the foreign trade.

## THE ARCHITECT.

**IRON AND ENGINEERING IN BUILDING.**—Iron is increasingly used in the construction of buildings, and with the increasing demand for the best forms and details of heating, ventilation and sanitation, it would appear, says *Building*, that ere long the progressive architect must be considerable of an engineer, besides having a knowledge of those things heretofore considered essential to being a first-class architect. And we would add that he must be a master steam-fitter *par excellence*. The architect of to-day, continues our cotemporary, is called upon to calculate the distribution of strains in floors composed of iron beams, and the cross-section of metal which is required at each point to safely and economically resist those strains. He must, in roof and in front, and often in floor construction, be able to figure the resistance of metal arches to complicated strains, dead and live loads, and is expected to be able to determine upon and devise forms of minimum weight of metal and of least cost to safely withstand these strains. As the heights of buildings increase, he must be able to figure their stability under high wind pressures; and if he would be fully up to his work, as superintendent of construction, he must be able to decide whether the iron delivered to him is of proper manufacture and of requisite strength and structure. Ever-increasing new schemes and devices for steam heating, ventilation and plumbing, make a demand upon the architect of a pretty thorough knowledge of the laws of physics, heat and hydraulics, and of their application in practice. Without such knowledge, the architect cannot decide whether the claims put forward in favor of special devices for heating, ventilation and plumbing rest on a sound basis or not.

**DEFECTIVE BRICKWORK.**—In 75 cases in 100 where fires occur from "unknown causes," writes an architect to the *Insurance World*, it can be traced to defective brickwork. Ordinarily an architect specifies that this brickwork shall be well slushed, and that the fines shall be well targeted or plastered on the inside. This is a great error, as no flue should be plastered on the inside, and no walls having fines in them should be slushed, as the term is generally understood. The fines in all cases should be built smooth on the inside, and all the joints should be filled with mortar, the vertical joints as well as bed joints. The lining of the flue, or the four inches surrounding the flue, should always be kept in advance of the brickwork, and the brick adjoining the lining and the second and third brick, and so on, should be shoved in soft mortar up against each other; this will fill all the vertical joints from bottom to top, as laid. The slushing that is ordinarily put in from the top only goes down into the joint about one-half inch, thus leaving an opening the entire length of the wall, and in some cases an opening which a mouse could crawl through. As it is only a question of time when all the plastering that can be put on the inside of a flue will fall off, it will leave these vertical joints between the bricks open into the flue, and as the joints cross through these joints in the brickwork, fire is liable to take place 10 or 20 feet away from the flue.

**DEADENING SOUND.**—A new method of deadening floors is to fill the spaces between a floor and a ceiling below with shavings made incombustible by saturating them in thick white-wash. It is said that this shuts out the sound more effectually than cement.

**PLASTER FOR MOLDINGS.**—Where walls and ceilings are to be molded while yet in a plastic state, some decorators are using a fibrous plaster, with the object of securing greater firmness and tenacity. The idea itself is not new, ani-

mal hairs having formerly been intermixed with lime, but this is a new application. In England and France a fine wire netting is at times inserted between two courses of plaster, to afford greater firmness in holding picture frames. The tenacity of some of the old moldings in old New York houses, while aristocratic, is very remarkable, retaining as they do their original sharpness of outlines.

**A NEW BUILDING MATERIAL.**—A new building material called stone-brick, harder than the hardest clay-brick, is made from simple mortar, but a scientifically made and perfect mortar; in fact, a hydraulic cement, and the grinding together of lime and sand in a dry state—including also some alumina, which is usually present in sand—and the subsequent heating by steam, give the mixture the properties of the burned hydraulic cements at present in use.

**CONTRACTORS.**—A gentleman having recently completed a dwelling-house, and after settling the original contracts, together with a number of large and burdensome "bills of extras," was heard to exclaim: "Contractors! why, the word contractors is a misnomer; they should be called expanders."

**IRON ROOFS AND GALLERIES.**—The Building Superintendent of New York City says that the roofs and galleries of theaters should be made of iron, and recommends an amendment of the existing law which shall make this requirement peremptory.

## Coast Industrial Notes.

A new shingle-mill at Mott, Siskiyou county, is turning out 30,000 a day, besides a large number of laths.

A fire at the West Coast Furniture Co.'s factory in this city on Monday last, caused a loss of \$20,000.

The Los Angeles Railroad has reached Burbank. A branch line is to be surveyed to Hueneme, Ventura county.

CALIFORNIA capitalists propose to take up 400,000 acres of pine timber land in New Mexico and open it by a railroad.

The big crane at the Union Iron Works last week lifted the six boilers out of the Queen of the Pacific, so that repair work on her bottom could be carried on.

At Oregon City a plant for the manufacture of cement is being put in at a cost of \$40,000. The rock is found in Douglas county, and the supply is said to be inexhaustible.

The narrow-gauge railroad from Reno is being pushed rapidly toward Susanville—250 men employed and easy grading. They are now near the Steinhilber place in Long Valley.

NO FATALITIES are reported from the Newcastle coal mine strike. The company says the mine shall stay closed till the contending labor societies settle the trouble among themselves.

A FURTHER decline has taken place in lead. Very large stocks remain in speculative hands, stored, which, as long as they remain unabsorbed by consumers, will have a depressing effect on the market.

The California Fruit Union has decided to continue the auctioning of fruit in the Eastern cities. Members will be allowed to ship on direct rate by paying the union \$30 per car-load for extra expenses, etc.

The hydraulic dock of the Union Iron Works is in constant demand. As fast as one vessel is repaired and removed another one is ready to take her place. The works are crowded with marine work of various descriptions.

CHINESE fruit-dealers are buying up the cherry and other fruit crops in many localities about Napa. They buy the fruit on the tree, and pick, pack and ship to San Francisco. They are shrewd buyers and hard workers and make the business pay.

The Pacific Varnish Company has incorporated with \$100,000 capital to do a general mercantile business. The capital is divided into 1000 shares. The directors are T. J. Chadbourn, J. C. Libbey, W. H. Worder, Charles W. Kellogg and Cary Howard.

NEARLY all of the local cigar dealers have large stocks on hand, and as a result work at the factories has been slack. In some instances manufacturers are running their factories on full time, but in others many of the employes have been given a spring vacation.

The solid men of Helena, Montana, have subscribed and planked up their oakh for nearly \$200,000 of the \$1,000,000 stock toward the erection of a mammoth smelter, etc., at or near Helena, and which action gives positive assurance that the institution will go ahead without further delay.

WIND power is now being utilized to a greater extent and in a greater variety of ways in California than ever before. Formerly it was confined to water pumping, but the wonderful improvements by which the manufacture of the iron windmill has been marked, have rendered it an effective substitute for steam in many places.

The new yacht being built for Captain Geo. Engel at Stone's shipyard, South San Francisco, is now all in frame, and has her decks and ceiling in. She is very near the same model as the *Realtess*, and will be 47 feet long; beam, 15 feet; depth, 4 feet, 6 inches. She will be fitted with

a cabin 6 feet high, have a kitchen and toilet-room, and four staterooms. She will be named the *Volunteer* and will cost \$4000.

It is stated that the Merchants' and Ship-owners' Tugboat Company have contracted with George Boole for a new steamer, to be 105 feet long, the machinery of which will be constructed by the Fulton Iron Works with all the latest improvements. She will be finished about October next.

At the Union Iron Works, in this city, a night shift has been working in the machine-shop of the works for some time, finishing a new cylinder for the steamer *San Jose*. The mammoth pumps for the Spring Valley Water Works at Belmont have been completed. The pumps and fittings weigh nearly 250 tons.

The last rail of the Los Angeles Company's railroad was laid on Saturday. The line extends from Los Angeles to Burbank, with a branch at Santa Monica. Two broad-gauge 35-ton locomotives and standard coaches will be used. Burbank secures the round-house and car-shops, and a branch line is to be surveyed to Hueneme.

A FRESNO paper states that Mock, Humphrey & Co. are at present constructing a new mill on the Reynolds claim. The mill will be supplied with the latest improvements in milling machinery and will have a capacity of 40,000 per day. Mr. A. Littlefield, not to be behind the times, has built him a water-power mill for the express purpose of manufacturing brake-blocks.

The total increase in the River and Harbor Bill, as reported to the Senate, is about \$1,500,000. The appropriation for Oakland is made \$350,000; for Wilmington, \$62,500; the canal at the Cascades, Or., \$300,000; the mouth of the Columbia, Or., \$500,000; the lower Willamette and Columbia in front of and below Portland, Or., \$100,000; the Willamette above Portland, \$29,000; Tillamook bay, Or., \$50,000; Yaquina bay, Or., \$150,000.

The Frazier sawmill, on Bear creek, one of the tributaries of Tule river, Tulare Co., has received a thorough overhauling within the past two or three weeks, and on Monday last commenced sawing lumber. The mill has a capacity of 40,000 feet per day, and an effort will be made to run it to its full capacity during this season. The mill is situated in the midst of the finest body of pine and redwood trees to be found in the Sierra Nevada mountains.

The local manufacturers of stained glass reports a large increase in their business this season as compared with that of last year. There is hardly a new cottage now going up in which stained glass is not used in one form or another. Much of the cheap colored ware comes from the East. Our manufacturers do not go into that line very extensively. There is more money in the better class of material, although it necessitates skilled labor and greater cost.

The San Joaquin Lumber Company has contracted for all the lumber that may be sawed by the Green & Kimball sawmill, on Dry creek, this season, all of which is to be delivered at Traver and the new town in the 76 country. The lumber sawed at the Comstock mill, which is expected to reach 3,000,000 feet this season, will all be delivered in Visalia, and what is not needed in this market will be shipped to points west and south of that city.

TRAMS loaded with lumber are coming from the sawmills in the mountains to Visalia every day in this week now. Last year it was a difficult matter to secure teams for this work, and many thousands of feet of lumber were left at the mills. This season, owing to the limited grain crop, no trouble is likely to be experienced in this line, and probably every foot of lumber that is sawed will be delivered on the plains before the snow again falls. And the demand for lumber, too, is likely to equal the supply.

The Red Funnel Tug Company has contracted for a new tug. The hull is to be constructed by George Boole, while the engine and machinery will be put in by the Fulton Iron Works. The new tug will be 105 feet over all, 22 feet beam and 11 feet 6 inches in depth of hold. She will have a vertical compound surface condensing engine, with the cylinders fore and aft. The diameter of the high-pressure cylinder will be 20 inches, while that of the lower pressure will be 40 inches, with a 26-inch stroke.

The new drawbridge of the San Francisco and North Pacific road across Pataluma creek is completed. The draw is the largest of its kind in the United States. The bridge itself is 3100 feet in length, the draw being 226 feet long, and the base 10 feet above the water line. The draw weighs 125 tons, can support a load of 290 tons, and rests on piles incased in iron. It is intended in the near future to discontinue the ferry service to Donahue Landing, and to have all passengers for the Sonoma Valley road go over on Tiburon boats.

BRODER & MOORE are having a steam engine and pump put in repair at the Agricultural Iron Works in Visalia which they intend to use in running a roller quartz mill at Sampson's Flat, 40 miles northeast of this city. They are also having shafting manufactured at the same works. The claim they propose to use the machinery on is named the "Sampson Flat Mine," and the quartz mill has a capacity of 10 or 12 tons per day. The ore from the mine assays from \$20 to \$60 per ton in gold. The mill has already gone forward to the mine.

Two or more of the British Columbia mines are making arrangements for increasing their

supplies. The Vancouver is putting in new machinery, working a new slope at the Southfield mine, and has put in a large fan for better ventilation at the No. 3 shaft. Dunsmuir & Sons will sink a new shaft midway between the Wellington and East Wellington properties. It is expected that this improvement will open up a large area of coal lands. Upon the completion of these arrangements we shall have more coal from British Columbia. The coal from that source is somewhat stronger than that received from most of the deposits in Washington Territory, and largely takes the place of Cardiff for steam purposes.

WORK on the Charleston at the Union Iron Works shipyard is being rapidly pushed forward by night and day shifts. The heavy side-plates of the outer sheath are now being riveted. The engines for the cruiser are lying in the shops ready to be set up as soon as the vessel has been launched. Material for cruiser No. 2 is being transferred to this spot, and preparations are being made to lay the keel as soon as the Charleston comes off the ways. The Pomona, the new 2000-ton coast steamer built for J. N. Knowles, was launched last week. The steamer is to be fitted for service on this coast. She is 230 feet in length, 33 feet beam and 26 feet in depth, and will register 1250 tons net. She is expected to attain a speed of 17 knots. The vessel will cost \$250,000.

JOHN W. MACKAY has inspected the California mill and its motive power thoroughly, and it is now pretty well settled that as soon as the Carson river fails to furnish enough power to continue the regular payment of dividends by the Con. Cal. Va. mine the California mill will be started up. Three-quarters of the mill will be run by water-power. Two wire ropes will be adjusted to run one-half of the mill, and one rope will run one-quarter of it. By detaching the main driving shaft at the pan mill to make two ropes run one-half of the mill, and one rope run one-quarter, the defects pointed out on the surface transmission of power are overcome, if the strain is equalized by a slack-catching gear. The company has a new complement of rope on hand, which will last not less than nine months under the new arrangement.

THE Portland Linseed Oil Co. has recently been formed at Portland, Oregon. Negotiations have been pending for some days for the purchase of a suitable location. This it is understood has been effected. Two blocks have been purchased on the line of the Northern Pacific, in the lower portion of the city. Since Mr. H. J. Corbett went East in the interest of the stockholders, it is learned that certain machinery, which it was hoped could be secured, cannot be obtained. This failure will necessitate the building of new machinery especially for the projected mill, and will involve an additional outlay of \$30,000. Plans and specifications for the building have already been completed, and now that the ground has been secured and arrangements in progress for purchasing the machinery, active work will doubtless be commenced soon. Six months it is expected will be all the time required to have the mill in readiness for operation from the date of the actual commencement of the work.

IN Siskiyou county, Hon. R. H. Campbell made a partial clean-up last week in his Quartz Valley hydraulic mine and realized over 1000 ounces. He has had an abundance of water to continue operations longer than usual this season, and will take out not less than 4000 ounces, or about \$60,000. The system of moving the banks by use of giant powder is a great help, and electric lights for night work has also been a great benefit. A company, comprising of leading citizens at Etna and Salmon river, has been organized to inaugurate one of the most extensive mining enterprises ever entered into in that section, for the purpose of working rich mining ground at Salmon river, some of whom now own claims. The object is to consolidate all the claims under one management and operate them on an extensive scale. The whole body of Salmon river is to be utilized in supplying two large ditches, at a cost of probably \$40,000, which would cover all the mines from Summerville to a point five miles below the Forks of Salmon, a distance of 30 miles. This company have now located 100 acres in addition to what they already own, besides bonding several other claims.

WHEN the Pacific Rolling Mills of this city cast the stern-post of the cruiser Charleston last June, it was, up to that time, the largest steel casting ever made on this continent. It weighed 15,000 pounds. On Saturday last, the same mill cast the stern-post of cruiser No. 5 (the San Francisco); the weight being 21,000 pounds. A great trench, 40 feet long, had been excavated in the floor of the foundry and suited to the angular shape of the stern-post. Weeks had been spent in the preparation of the pattern and in the construction of a perfect mold. Every precaution which the experience of the management and the skill of the workmen could suggest had been taken, and Saturday every condition was perfected, the valves were opened, and in less than 15 seconds the whole 30,000 pounds of molten steel were emptied from the furnace into the mold, and, to all appearances, the casting was successfully accomplished. The casting, besides being very successful, was a remarkable quick one, it having been accomplished in one-quarter less time than was occupied by the stern-post of the Charleston.



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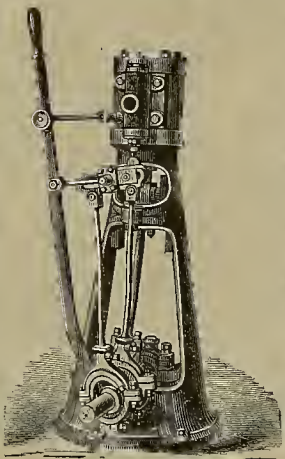
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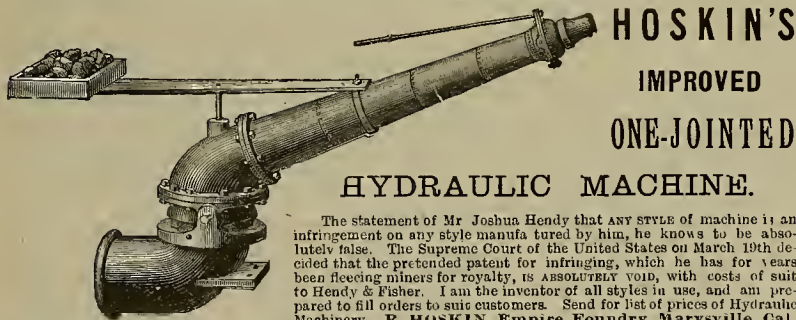
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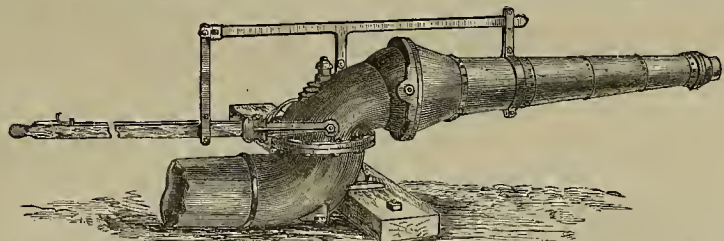


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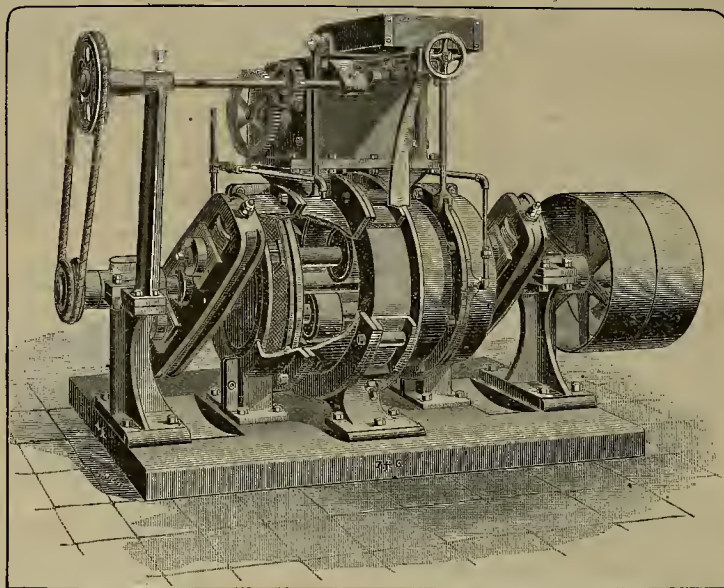
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IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.

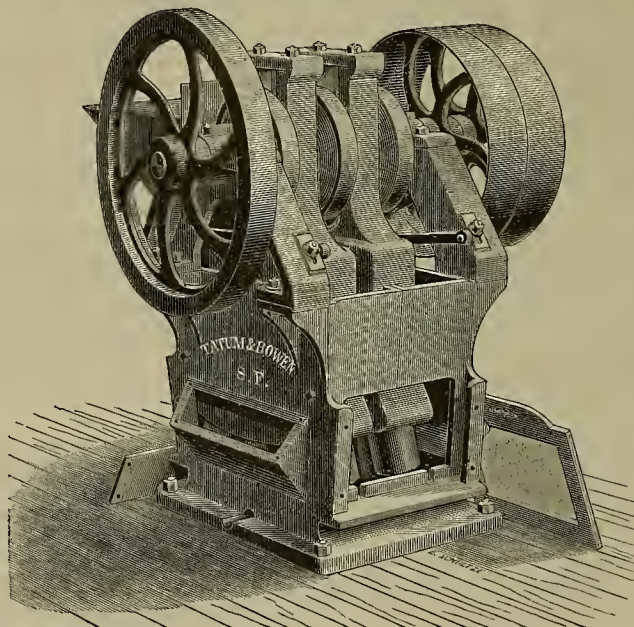
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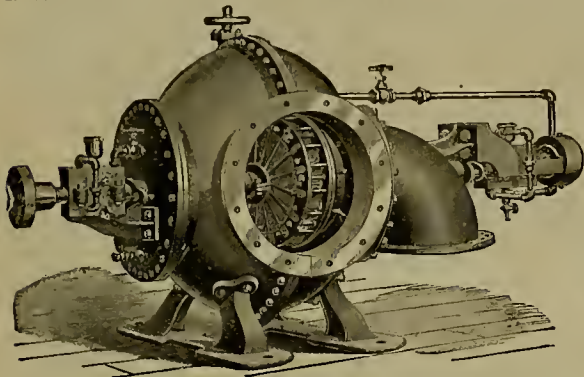
MEXICO OFFICE:

No. 11 Calle de Juarez, Oahuahua, Mexico.

UTAH OFFICE—SALT LAKE CITY, UTAH.

## JAMES LEFFEL'S

## Mining Turbine Water Wheel.



These Wheels are designed for all purposes where limited quantities of water and high heads are utilized, and are guaranteed to give more power with less water than any other wheel made. Being placed on horizontal shaft, the power is transmitted direct to shafting by belts, dispensing with gearing.  
Estimates furnished on application for wheels specially built and adapted in capacity to suit any particular case.  
Further information can be obtained of this form of construction, as well as the ordinary Vertical Turbines for Wooden Penstocks and in Iron Globe Cases, free of cost, by applying to the manufacturers.

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Springfield, Ohio, or 110 Liberty St., New York.

FRASER & CHALMERS, General Agents,  
Chicago, Ill., and Denver, Col.

PARKE & LACY, General Agents, San Francisco, Cal.

## Metallurgy and Ores.

### SELBY

## SMELTING and LEAD CO.

416 Montgomery St., San Francisco.

GOLD AND SILVER REFINERY  
And Assay Office.

Highest Prices Paid for Gold, Silver and  
Lead Ores and Sulphurets.

....MANUFACTURERS OF....

BLUESTONE,

LEAD PIPE,

SHEET LEAD,

SHOT, Etc., Etc.

ALSO MANUFACTURERS OF

Standard Shot-Gun Cartridges,  
Under Chamberlin Patent.

## JOHN TAYLOR & CO.,

IMPORTERS AND DEALERS IN

ASSAYERS' MATERIALS, MINE  
AND MILL SUPPLIES,

CHEMICAL APPARATUS AND CHEMICALS, DRUG  
GISTS' GLASSWARE AND SUNDRIES, ETC.

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We would call the attention of Assayers, Chemists, Mining Companies, Milling Companies, Prospectors, etc., to our full stock of Balances, Furnaces, Muffles, Crucibles, Scorifiers, etc., including, also, a full stock of Chemicals.

Having been engaged in furnishing these supplies since the first discovery of mines on the Pacific Coast, we feel confident from our experience we can well suit the demand for these goods, both as to quality and price. Our New Illustrated Catalogue, with prices, will be sent on application.

Our Gold and Silver Tables, showing the value per ounce Troy at different degrees of fineness, and valuable tables for computation of assays in grains and grammes, will be sent free upon application. Agents for the Patent Plumbago Crucible Co., London, England. Also for E. O. DENISON'S Silver Plated Amalgam Plates. The plates of this well-known manufacturer are thoroughly reliable, and full weight of Silver guaranteed. Orders taken at his lowest prices.

JOHN TAYLOR & CO.

## Nevada Metallurgical Works.

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Near First and Market Streets, S. F.

C. A. LUCKHARDT, Manager.

ESTABLISHED 1869

Ores worked by any Process.

Ores Sampled.

Assaying in all its Branches.

Analyses of Ores, Minerals, Waters, etc.

Working Tests (practical) Made.

Plans and Specifications furnished for the most suitable Process for Working Ores.

Special attention paid to Examinations of Mines; Plans and Reports furnished.

C. A. LUCKHARDT & CO.,

(Formerly Huhn & Luckhardt,

Mining Engineers and Metallurgists

J. KUSTEL.

H. KUSTEL.

## METALLURGICAL WORKS.

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Corner of Leldesdorf Street, . . . SAN FRANCISCO

Ores Sampled and Assayed, and Tests made by my

Process.

Assaying and Analysis of Ores, Minerals and Waters.

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Practical Instruction given Treating Ores by improved processes.

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Mining Engineers and Metallurgists.

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## American Exchange Hotel.

San Francisco, One door from Bank of Cal.



The above Hotel is situated in the midst of the Banking and Commercial Houses of the city, and is by far the most home-like and desirable Hotel to stop at.

CHAS. & WM. MONTGOMERY, Prop're

## THE RUSSELL PROCESS COMP'Y.

G. A. STETEFELDT, President.

NEW YORK OFFICE, 18 BROADWAY  
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## H.H.H.

HORSE LINIMENT.



THE H. H. H. Horse Liniment puts new life into the Antiquated Horse! For the last 14 years the H. H. H. Horse Liniment has been the leading remedy among Farmers and Stockmen for the cure of Sprains, Bruises, Stiff Joints, Spasms, Windgalls, Sore Shoulders, etc., and for Family Use is without an equal for Rheumatism, Neuralgia, Aches, Pains, Bruises, Cuts and Sprains of all characters. The H. H. H. Liniment has many imitations, and we caution the Public to see that the Trade Mark "H. H. H." is on every Bottle before purchasing. For sale everywhere for 50 cents and \$1.00 per Bottle.

For Sale by all Druggists

## HEALD'S BUSINESS COLLEGE,

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FOR SEVENTY-FIVE DOLLARS THIS College instructs in Shorthand, Typo Writing, Book-keeping, Telegraphy, Penmanship, Drawing, all the English branches, and everything pertaining to business, for six full months. We have sixteen teachers, and give individual instruction to all our pupils. Our school has its graduates in every part of the State.

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E. P. HEALD, President.

C. S. HALEY, Secretary.

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LIFE SCHOLARSHIPS, \$75.  
NO VACATIONS. DAY AND EVENING SESSIONS.  
Ladies admitted into all Departments.  
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## THE GIANT POWDER COMPANY

Manufacture Three Kinds of Powder, which are acknowledged by all the Great Chemists of the World as

The Safest and Strongest High Explosives in the Market.

## GIANT POWDER OR DYNAMITE,

Of Different Strengths as Required.

NOBEL'S EXPLOSIVE GELATINE," which contains 94 per cent of Nitro-Glycerine, and GELATINE-DYNAMITE, Stronger than Dynamite and even Safer in Handling.

## JUDSON POWDER IMPROVED.

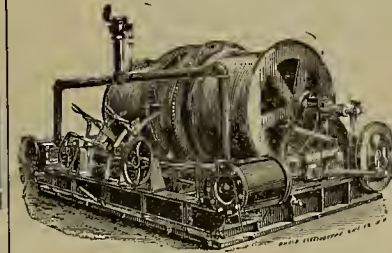
FOR RAILROADS AND LAND CLEARING. Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

## BANDMANN, NIELSEN & CO.,

COAPS and FUSE for Sale

GENERAL AGENTS, SAN FRANCISCO CAL.

## HOISTING ENGINES FOR MINES.



1, 2, or 4 Drums, with Reversible Link  
Motion or Pat. Improved Friction.

MADE ONLY BY THE

LIDGERWOOD M'FG COMPANY,  
96 Liberty St., New York.

PACIFIC COAST AGENTS,

PARKE, LACY & CO.  
SAN FRANCISCO.

## THOMAS PRICE'S ASSAY OFFICE, CHEMICAL LABORATORY,

## BULLION ROOMS and ORE FLOORS,

524 Sacramento Street, San Francisco, Cal.

COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed of in the Open Market to the Highest Bidder.



## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING MAY 22, 1888.

- 383,103.—INSERTED SAW-TOOTH—F. W. Cook, S. F.
- 383,345.—RHEOSTAL—F. J. Crouch, Eugene City, Ogn.
- 383,105.—ELECTROPHORUS—J. D. Culp, San Felipe, Cal.
- 383,220.—DISTRICT TELEGRAPH CALL BOX—J. B. Gill, S. F.
- 383,293.—LIFTING-JACK—M. Hedges, Murietta, Cal.
- 383,295.—POWER MECHANISM—W. A. Howard, Petaluma, Cal.
- 383,179.—TRACTION ENGINE—D. B. James, Visalia, Cal.
- 383,301.—SOLDERING MACHINE—J. S. Johnson, Portland, Ogn.
- 383,228.—COIN ACTUATED BILLIARD MARKER—E. C. Jones, S. F.
- 383,230.—STATION INDICATOR—J. C. Ludwig, S. F.
- 383,233.—COMBINED HARVESTER—D. C. Matteson, Stockton, Cal.
- 383,159.—SAFETY CATCH FOR CABLE R. R.—Chas. Vogel, S. F.
- 383,161.—WIRE SCREEN, ETC.—D. Wesemann, Los Angeles, Cal.
- NOTE.—Copies of U. S. and Foreign Patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**POWER MECHANISM.**—Wm. A. Howard, Petaluma. Assignor of one-half to Chas. W. Adamson. No. 383,295. Dated May 22d, 1888. This invention relates to the class of mechanism for applying power to operate pumps and other machines. It consists in an annular series of connected pivoted levers, each having a connection with the machine or machines to be driven, and in a rolling wheel or wheels traveling over said levers, whereby they are all simultaneously oscillated, adjacent ones in opposite directions. The invention further consists in connection with said levers and the rolling power wheel or wheels, of a fixed circular track concentric with the series of levers, and upon which said wheel or wheels travel as they run down successive levers.

**STATION INDICATOR.**—John C. Ludwig, S. F. No. 383,230. Dated May 22, 1888. This is one of that class of station indicators in which a ribbon bearing the names of the streets or stations is made to travel upon suitably arranged drums by means of a clock-work mechanism which is periodically set in operation and checked again. And the invention consists in a peculiar escapement and ebecking mechanism, and in the connection of the alarm apparatus therewith. Several details of construction are covered by the patent.

**COMBINED HARVESTER AND THRASHER.**—Don C. Matteson, Stockton. No. 383,233. Dated May 22, 1888. In this machine the header frame is hinged to the side of the thrashing frame so as to be removable in the usual manner when it is desired to transport the machine or to pass through narrow gates or openings, where it would be impossible to transport the machine as a whole. When this is done, the wheel at the outside of the header frame is removed and a pair of wheels or trucks is placed beneath the header frame so that it may be thus drawn in a direction at right angles with the usual mode of progression. As the supplemental wheels upon which this portion is transported when separated from the thrasher stand at right angles with the usual direction of motion, it will be seen that it will travel in a line parallel with the sickle, and the folded-over portion will thus narrow the machine so considerably that it may pass through gates which are of any of the usual dimensions. A new device is also employed to prevent loss of grain at the point where the spout of the belt from the header discharges upon the feeder belt.

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

JOHN G. H. LAMPADUS—Santa Barbara Co.  
G. W. INOALLES—Arizona Territory.  
A. F. JEWETT—Tulare Co.  
C. E. WILLIAMS—Yuba and Sutter Co.'s.  
R. G. HUGGON—Montana Territory.  
G. D. CUMMINS—Butte and Tehama Co.'s.  
J. L. DOYLE—Kern Co.  
W. W. THORALDS—Contra Costa Co.

MEMORIAL DAY was appropriately celebrated in San Francisco and Oakland by public exercises and processions to the cemeteries, where the graves of the Veterans were decorated with flowers. Wednesday was observed as a general holiday.

## Mining Share Market.

There is very little activity in mining stocks. No session of the board occurred on Memorial Day. The Comstock mines continue vigorous work with increasing bullion output. Con. California and Virginia shipped during the last week 1185 tons ore to the Morgan mill and 1836 tons to the Eureka mill. This ore assayed \$36.37. Bullion valued at \$20,000 is now on hand at the Virginia office, and \$80,590 was shipped to the Carson Mint during the week. Gold and Curry last week took out 224 tons, assaying \$28.49, and has bullion valued at \$64,000 on hand. Savage has shipped \$28,000 on May account, and sends to mill daily 80 tons, assaying \$25.

From Hale and Norcross ore shipments for the week aggregate 1400 tons, showing an assay of \$37 per ton. Bullion valued at \$70,574.97 on hand on May account.

From Confidence ore shipments of 190 tons continue daily, showing a value of \$34.20 per ton.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Germania, May 22, \$1,797; Hanauer, 27, \$4,200; Queen of the Hills, 22, \$2,250; Con. California and Virginia, 26, \$80,598; Savage, 20, \$28,000; Hale & Norcross, 26, \$70,574; Hanauer, 27, \$4,200; Germania, 27, \$1,911; Hanauer, 27, \$2,110; Crescent, 24, \$2,000; Hanauer, 25, \$2,100; Crescent, 25, \$1,595; Lexington, 20, \$38,860; Alice, 20, \$13,992; Blue Bird, 16, \$18,560.

**THE COPPER SYNDICATE.**—The French syndicate is not satisfied with binding the leading producers of copper throughout the world in a three-years' contract not to sell under a certain figure, supposed to be 13c, but has now made contracts with copper consumers. In this way it hopes to protect both parties with a cast-iron rate, which is remunerative to all parties. Referring to this last operation of the French syndicate, a contemporary says: "The contract is for between 30,000,000 and 40,000,000 pounds at 16.50 cents. The terms were originally for six months, but it is believed it has since been changed to four months; it is certainly not less than the latter. The syndicate agrees not to allow the price to decline below 16.50 cents. The consumers, on their part, can purchase what copper they want for consumption, but cannot resell upon the market, and as all ingots, cakes and bars are stamped, they can easily be traced, and the party found reselling can be held liable under the contract."

**A BIG DODGE CRUSHER.**—The largest ore-crusher ever built was completed at Savage's foundry this week for Parke & Lacy, for shipment to Australia. It is of the Dodge pattern and is called the Giant. The size of machine is 15x20 in. It weighs 16 tons and has a capacity of 500 tons of ore per day. This machine has all the latest improvements. A number of Dodge crushers are now being built for Australian mines.

## San Francisco Metal Market.

WHOLESALE.

THURSDAY, May 31, 1888.

ANTIMONY—French Star.....	9 @ 94
BORAX—Refined.....	7 @
Powdered.....	7 @
Concentrated.....	6 @
COPPER—	
Bulk.....	26 @
Ingots.....	26 @
Fire Box Sheets.....	26 @
Iron—Cleveland tool.....	23 @
Edington ton.....	23 @
American Soft No. 1 ton.....	21 @
Oregon Pig-ton.....	21 @
Clay Lane White.....	21 @
Shot, No. 10.....	21 @
Bar.....	5 @ 50
Sheet.....	8 @
Shot, discount 10% on 500 bag Drop, @ bag.....	2 @
Buck, @ bag.....	2 @
Chilled do.....	0 @
STEEL—English, lb.....	16 @ 20
Black Diamond tool.....	10 @ 16
Pick and Hammer.....	8 @ 10
Machinery.....	6 @ 8
Toe Calk.....	4 @
TINPLATE—Coke.....	5 @ 20
Charcoal.....	5 @ 60
QUICKSILVER—By the flask.....	35 @ 40
Flasks, new.....	1 @ 60
Flasks, old.....	85 @

## New York Metal Market.

Telegraphic advices dated May 31st give the following New York prices:

BAR SILVER—91½c per oz.  
BORAX—9c.  
COPPER—LAKES—\$16.60.  
IRON—No. 1, \$22.00.  
LEAD—\$4.07½.  
TIN—\$19.60.

The following is the latest by mail from the "New York Metal Exchange Market Report":  
COPPER—Nominal, spot closing at \$16.60. Transferable Notices (Lake) issued at \$16.20.  
LEAD—Firm, at \$4.00 spot. Transferable Notices issued at \$4.20.  
TIN—Nominal at \$20.60.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, @—Baltimore Copper, \$16.00. Banca Tin, @—Baltimore Copper, \$16.00. Orford Copper, \$16.60. P. S. C. Copper, @—Foreign Lead, \$4.60. Foreign Spelter, \$5.60. Antimony, \$10.50.

THERE have been great floods this season in Kansas, Nebraska and parts of Minnesota.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

ASSESSMENTS.

COMPANY.	LOCATION.	No.	AMT. LEVIED.	DELIN'T. SALE.	SECRETARY.	PLACE OF BUSINESS.		
Alta M Co.	Nevada.	37.	50.	May 12.	June 18.	July 9.	W H Watson.	302 Montgomery St
Arnold M Co.	Arizona.	4.	75.	May 1.	June 4.	June 26.	A. Judson.	320 Sansome St
Bulwer Con M Co.	California.	4.	20.	May 3.	June 7.	July 5.	L Osborn.	309 Montgomery St
Baltimore S M Co.	Nevada.	1.	25.	Apr 10.	May 21.	June 8.	W L Brown.	402 Montgomery St
Crown Point M Co.	Nevada.	49.	50.	Apr 13.	May 16.	June 6.	J Newlands.	329 Pine St
California State Co.	California.	1.	10.	Apr 13.	May 24.	June 25.	J H Hanscom.	10 California St
Gray Eagle M Co.	California.	7.	50.	May 1.	June 2.	June 22.	T W Hazel.	522 Montgomery St
Golden Prize M Co.	Nevada.	1.	25.	Apr 21.	May 2.	June 16.	C D Bennett.	328 Montgomery St
Justice M Co.	Nevada.	46.	25.	Apr 7.	June 11.	July 2.	R E Kelley.	419 California St
Mayflower Gravel M Co.	California.	41.	25.	Apr 9.	May 14.	June 4.	J Morioz.	328 Montgomery St
Navajo M Co.	Nevada.	13.	30.	Apr 12.	May 17.	June 7.	J W Pew.	310 Pine St
Paradise Valley M Co.	Nevada.	5.	15.	Apr 21.	May 23.	June 18.	A Chemnitz.	328 Montgomery St
Scorpion M Co.	Nevada.	25.	10.	May 15.	June 22.	July 16.	G R Spinnay.	310 Pine St
Tioga M Co.	California.	18.	10.	May 1.	June 5.	June 27.	B L Bushing.	309 Montgomery St
Utah Con M Co.	Nevada.	4.	25.	May 4.	June 8.	June 26.	A H Fish.	309 Montgomery St

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING.	DATE.
Alabama M Co.	California.	J J Smith.	5th & Stevenson Sts.	Special.	June 11
Crown Point M Co.	Nevada.	J Newlands.	329 Pine St.	Annual.	June 4
Gover M Co.	California.	L G Harvey.	13 Fremont St.	Annual.	June 12
Seg Belcher & Mides Con M Co.	California.	E H Holmes.	309 Montgomery St.	Annual.	June 5

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A W Havens.	309 Montgomery St.	50.	May 10
Confidence S M Co.	Nevada.	A S. roch.		2.00.	May 10
Eureka Con M Co.	Nevada.	H F F. Hutson.		50.	June 7
North Belle Isle M Co.	Nevada.	J W Pew.	310 Pine St.	50.	May 7
Hale & Norcross S M Co.	Nevada.	A H Clough.		50.	May 7
Oregon Coal & Navigation Co.	Oregon.	R B Williams.	211 Sansome St.	1.50.	Mar 2
Pacific Iron, Salt & Soda Co.	California.	A H Clough.	230 Montgomery St.	1.00.	May 12
Standard Con M Co.	California.	J W Pew.	310 Pine St.	50.	May 12

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING May 10.	WEEK ENDING May 17.	WEEK ENDING May 24.	WEEK ENDING May 31.
Alfa.....	2.25	2.60	1.70	2.05
Alta.....	1.80	2.00	1.20	1.60
Andes.....	1.50	1.70	1.35	1.40
Argentina.....	1.00	1.10	1.00	1.10
Belcher.....	6.00	7.1	5.25	6.75
Best & Belcher.....	4.50	5.4	4.20	4.65
Bullion.....	1.60	1.55	1.35	1.65
Baltimore.....	.70	.80	.35	.70
Belle Isle.....	.55	.55	.45	.55
Bulwer Con.....	2.00	3.20	2.45	2.85
Benton.....	.....	.....	2.00	1.75
Bodie Tunnel.....	.....	.....	.....	.....
Bulwer.....	.65	1.00	.....	.70
Con Va & Cal.....	12	12	10	11
Challenge.....	7.50	8.25	5.75	6.75
Champion.....	4.80	5.30	3.95	4.50
Chollar.....	.36	.38	.31	.32
Confidence.....	.50	.48	.35	.50
Copied.....	.60	.65	.40	.50
Crown Point.....	6.25	7.1	5.3	6.00
Crocker.....	1.35	2.00	1.20	1.65
Con Va.....	.40	.45	.35	.45
Dudley.....	.....	.....	30	.....
East B. & E.....	.....	.....	.....	.....
Eureka Con.....	101	101	.....	9.00
Exchequer.....	1.40	1.50	1.30	1.05
Grand Prize.....	2.10	2.15	2.05	2.35
Gould & Norcross.....	4.50	4.90	4.20	4.50
Hale & Norcross.....	8	9.25	7.1	8.00
Holmes.....	.....	.....	.....	.....
Independence.....	.....	.....	.....	.....
Iowa.....	1.10	1.20	1.15	1.00
Julia.....	.55	.70	.40	.50
Justice.....	1.05	1.20	.75	.85
Kentuck.....	3.40	3.60	2.70	2.90
Lady Wash.....	.....	.50	.35	.40
Martina White.....	.....	.....	.....	.....
Mono.....	1.76	2.00	1.55	1.70
Mexican.....	4.60	5.1	4.25	4.50
Mt. Diablo.....	.....	3.50	.....	3.50
Northern Belle.....	1.65	1.75	1.55	1.75
Nevada.....	4.20	4.20	4.10	4.20
North Belle Isle.....	4.50	4.75	4.00	4.25
Niagara.....	3.50	3.90	3.80	4.15
New Queen.....	1.70	1.75	1.30	1.45
North C. & C.....	8	9.25	7.1	8.00
Occidental.....	2.25	2.60	1.85	2.10
Overman.....	2.25	2.60	1.85	2.10
Potosi.....	1.30	1.40	1.25	1.35
Pear.....	1.15	1.20	1.05	1.10
Peerless.....	1.05	1.40	.80	1.20
Perr.....	.....	.....	.....	.....
P. Sheridan.....	.....	.....	.....	.....
Silver Star.....	.....	.....	.....	.....
Savage.....	5.1	5.75	4.30	5.25
S. B. & M.....	4.20	4.20	4.10	4.20
Sierra Nevada.....	4.25	4.60	3.80	4.30
Silver Hill.....	.....	.70	.55	.60
Silver King.....	.....	.70	.60	.65
Scorpion.....	.....	.70	.60	.65
Spokane.....	.....	.....	.....	.....
Union Con.....	8.75	4.30	3.15	5.55
Utah.....	1.65	1.95	1.45	1.65
Yellow Jacket.....	6.50	7.50	5.75	6.50

## Sales at San Francisco Stock Exchange.

WEDNESDAY May 30.		150 Iowa.....	35c
350 Alpha.....	1.50	200 Julia.....	35c
100 Alta.....	1.00	380 Justice.....	55c
350 Andes.....	1.10	200 Loom.....	25c
100 Baltimore.....	1.10	350 Mexican.....	3.75
800 Belcher.....	4.30	200 Mono.....	1.20
230 B. & Belcher.....	3.80	50 N. Belle ls.....	3.10
200 Bullion.....	1.20	750 Navajo.....	2.60
410 Bulwer.....	5.50	150 Ophir.....	2.60
350 Bulwer.....	5.50	950 Overman.....	1.40
100 Belle Isle.....	50c	400 Occidental Con.....	1.20
520 Challenge.....	4.00	500 Peerless.....	2.20
200 Chollar.....	3.40	700 Peer.....	2.30
250 Con Va & Cal.....	101	530 Potosi.....	3.30
700 Crocker.....	1.05	200 Silver Hill.....	45c
580 Crown Point.....	4.30	500 Savage.....	3.80
810 Con. Imperial.....	40c	200 Scorpion.....	55c
200 Confidence.....	14	200 S. B. & M.....	70c
1000 Exchequer.....	55c	200 Sierra Nevada.....	4.10
230 Eureka Con.....	8	740 Union Con.....	3.15
350 Gould & Curry.....	3.60	720 Utah.....	1.25
200 Grand Prize.....	2.20	200 Weldon.....	70c
100 Hale & Nor.....	7	200 Yellow Jacket.....	4.55

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3.00 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

WILLIAM CUNNINGHAM has been elected secretary of the Eureka Consolidated Mining Co., in place of H. R. P. Hinton, resigned.

J. A. JOHNSON, 307 Montgomery street) the Nevada Bank building) is the general agent of the Siles quartz machinery, and offers easy terms for introduction.

## To Every Pump Maker, Owner! Runner! Agent!

If there is ANY PRACTICAL QUESTION concerning ANY APPLICATION or ANY ADJUSTMENT of ANY KIND of a PUMP which is not answered in MR. ROBERT GRIMSHAW'S PUMP CATECHISM, we would like to have it for answer in the next edition or volume.

The Author will answer any such question in our columns, if addressed in our care, by a regular mail subscriber to our paper. "Catch" questions invited, if they have a practical bearing.

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NOTICE—There are delinquent, upon the following described stock, on account of Assessment No. 12, levied on the 27th day of March, 1888, the several amounts set opposite the names of the respective Shareholders, as follows:

Names.	No. Certificates.	No. Shares.	Amount.
J. D. Dexter, Tr.	46	100	5 00
J. D. Dexter, Tr.	48	100	5 00
J. D. Dexter, Tr.	49	100	5 00
J. D. Dexter, Tr.	63	500	25 00
Ed. Dexter, Tr.	80	500	25 00
Chas. Moss	92	500	25 00
B. Frank Moss	95	500	25 00

And in accordance with law, and an order of the Board of Directors, made on the 27th day of March, 1888, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Market street, San Francisco, Cal., on Monday, the 25th day of May, 1888, at the hour of 1 o'clock P. M., of said day, to pay Delinquent Assessments thereon, together with costs of advertising and expenses of the sale.

LOUIS R. LEVY, Secretary.

OFFICE—213 Market St., San Francisco, Cal.

POSTPONEMENT.

The above sale day is hereby postponed to MONDAY, June 11, 1888, at the same hour and place. By order of the Board of Directors. LOUIS R. LEVY, Secy.

MEETING NOTICE.

**Office of the Alabama Mining Company,**  
Corner of Fifth and Stevenson streets, San Francisco, California, May 12, 1888. Location of works, near Newcastle, Placer county, California.

NOTICE is hereby given to all the Stockholders of said Alabama Mining Company (a corporation) that there will be a general meeting of the Stockholders of said company held at the office of said company at the S. W. corner of Fifth and Stevenson streets, in the city of San Francisco, Cal., on Monday, the 11th day of June, A. D. 1888, at the hour of 1 o'clock P. M., of said day, for the purpose of removing from office the following named Directors of said company, to wit: Owen King, William Reinhold, Samuel Jones and Michael Hoffman, and for the further purpose of filling by election then and there the vacancies that may be caused in the Board of Directors by such removals.

The undersigned is the owner of more than two-thirds of the capital stock of said corporation, as well as a Director and President of said Company, and makes this call under the provisions of Section 310 of the Civil Code.

J. J. SMITH,

President of the Alabama Mining Company.

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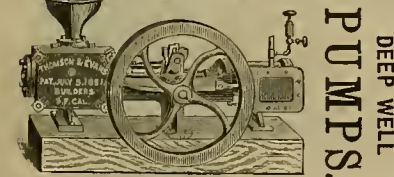
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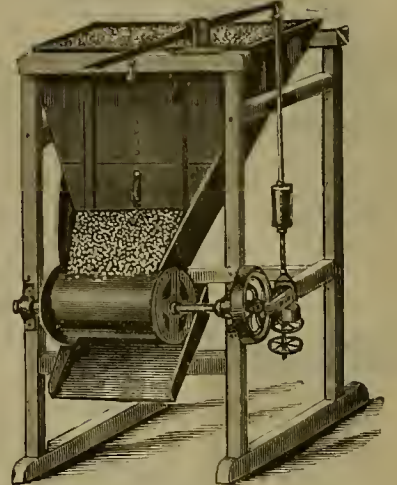
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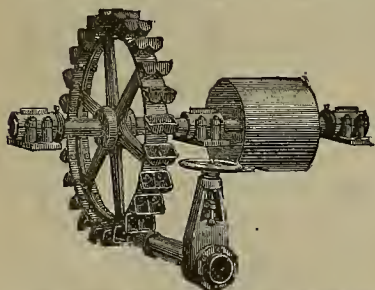
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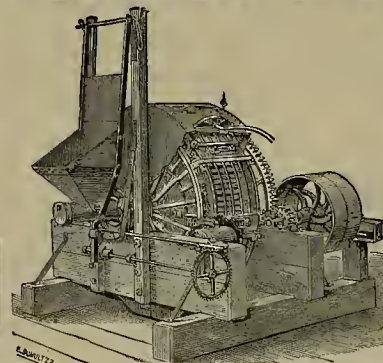
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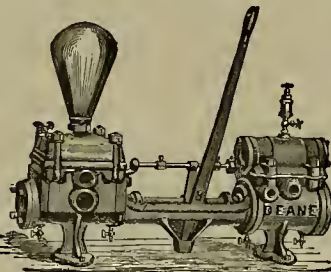
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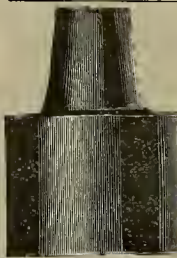
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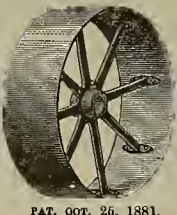
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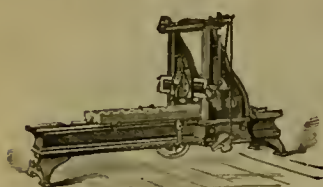
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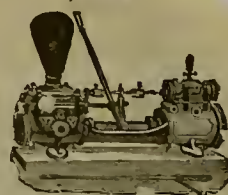


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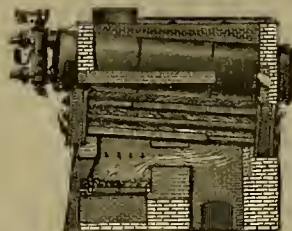
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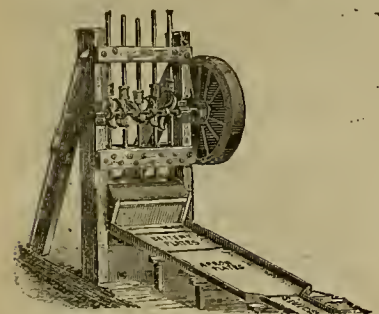
IN QUARTZ, GRAVEL, OR PLACER MINES. MADE OF BEST SOFT LAKE SUPERIOR COPPER  
FULL WEIGHT OF SILVER AND BEST QUALITY OF WORK GUARANTEED.

GET OUR PRICES BEFORE ORDERING ELSEWHERE. SAMPLES  
FURNISHED ON APPLICATION.

**SAN FRANCISCO NOVELTY AND PLATING WORKS,  
No. 108 FIRST STREET.**

NOTICE.—All our plates are guaranteed to have  
the full weight of silver agreed upon, and are tested be-  
fore leaving our works, thereby avoiding the complaints  
about light weight, made so often before we started  
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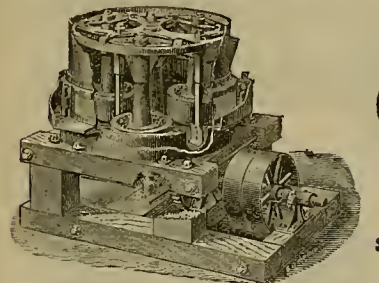
**JUSTINIAN CAIRE, Agent,**  
521 & 523 Market St., San Francisco,  
—DEALER IN—  
**Assayers' and Mining Material.**  
—MANUFACTURER OF—  
**BATTERY SCREENS and WIRE CLOTH**  
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**HYDRO-CARBON ASSAY FURNACES.**



## ATTENTION, GOLD MINERS! WE ARE SELLING Silver-Plated Amalgamating Plates For Saving Gold in QUARTZ, GRAVEL and PLACER MINING.

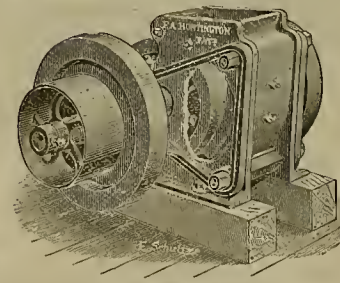
At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best,  
and far superior to others in weight of silver and durability. Old mining plates replated. These plates can also be  
purchased of **JOHN TAYLOR & CO., cor. First and Mission Sts.**

**SAN FRANCISCO GOLD, SILVER and NICKEL PLATING WORKS,**  
**E. G. DENNISTON, Proprietor.** 653 & 655 Mission St., San Francisco, Cal.  
NOTICE.—Our Silver Plated Plates have always proved as represented. We have been manufacturing them for 20 years,  
and use only the best Lake Superior Copper and Refined Silver. Comparing our plates with those of other manufacturers,  
after repeated tests, we can safely guarantee much better plates for the same money. Our plates are used by all the promi-  
nent mining men on the Pacific Coast. SEND FOR CIRCULAR.



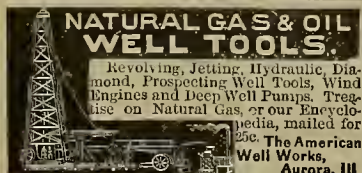
Centrifugal Roller Quartz Mill.

**F. A. HUNTINGTON,**  
MANUFACTURER OF  
**Centrifugal Roller Quartz Mills,  
CONCENTRATORS AND ORE CRUSHERS,**  
Mining Machinery of Every Description,  
**Steam Engines and Shingle Machines.**  
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No. 45 FREMONT STREET, - - SAN FRANCISCO, CAL.



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ure on Natural Gas, or our Encyclo-  
pedia, mailed for  
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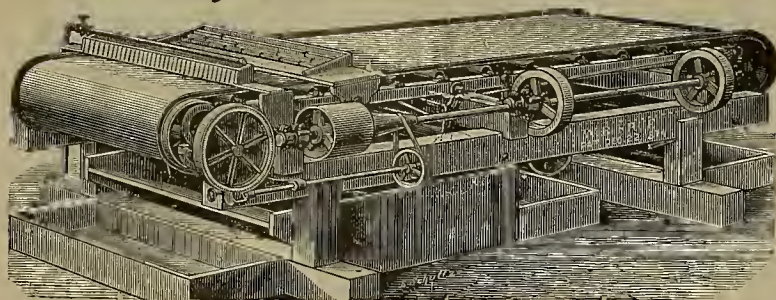
Engravings made from photographs, drawings and original designs, for newspaper, book, card and job printing.  
Engraved prints enlarged or reduced, cheaply and quickly. Also copies of manuscript, legal documents, wills,  
contracts, signatures, portraits, buildings, machinery and printed documents reproduced with accuracy. Photo-  
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lithographs, and steel or wood engravings, etc. Satisfaction guaranteed. Agents wanted in all cities and in all  
towns. Address, for further information, DEWEY ENGRAVING Co., 220 Market St., San Francisco.

**New Almaden Quicksilver.**

**J. B. RANDOL,**  
Room 22, 320 Sansome St.,  
San Francisco.



# \$1,000 CHALLENGE!



**THE FRUE ORE CONCENTRATOR  
OR VANNING MACHINE.**

**PRICE: FIVE HUNDRED AND SEVENTY-FIVE DOLLARS  
(\$575.00) F. O. B.**

OVER 1400 ARE NOW IN USE. Concentrations are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

THE MONTANA COMPANY (Limited), LONDON, October 8, 1885.

DEAR SIR:—Having tested three of your Frue Vannera in a competitive trial with other similar machines (Triumph), we have satisfied ourselves of the superiority of your Vannera, as is evidenced by the fact of our having ordered twenty more of your machines for immediate delivery. Yours truly,

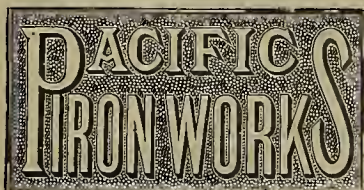
THE MONTANA COMPANY (Limited).

N. B.—Since the above was written the 20 Vannera having been started gave such satisfaction that 44 additional Fruee and more stamps have been purchased.

ADAMS & CARTER.

Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

**ADAMS & CARTER, Agents Frue Vanning Machine Co.,  
Room 7, No. 109 California Street, SAN FRANCISCO, CAL.**



1850. — BUILDERS OF — 1888.

## MINING MACHINERY.

GENERAL OFFICE AND WORKS:

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New York Office, 145 Broadway.

PLANTS FOR GOLD AND SILVER MILLS, embracing machinery of LATEST DESIGN and MOST IMPROVED construction. We offer our customers the BEST RESULTS OF 38 YEARS' EXPERIENCE in this SPECIAL LINE of work, and are PREPARED to furnish the MOST APPROVED character of MINING AND REDUCTION MACHINERY, adapted to all grades of ores and SUPERIOR to that of any other make, at the LOWEST POSSIBLE PRICES.

We are also prepared to CONSTRUCT and DELIVER in COMPLETE RUNNING ORDER, in any locality, MILLS, CONCENTRATION WORKS, WATER JACKET SMELTING FURNACES, HOISTING WORKS, PUMPING MACHINERY, ETC., ETC., of any DESIRED CAPACITY.

# The Pelton Water Wheel

Gives the highest efficiency of any Wheel made, and is the standard for high pressure service in all parts of the world. Over Five Hundred are in use on the Pacific Coast alone, running Quartz Mills, Hoisting and Pumping Works, Electric Plants for power and light, as well as for various manufacturing purposes.

They are adapted to any head of water from 20 feet up to 1000 feet. These Wheels are now coming largely into use in connection with Electrical Transmission, furnishing power which is carried long distances with but small loss.

Address:

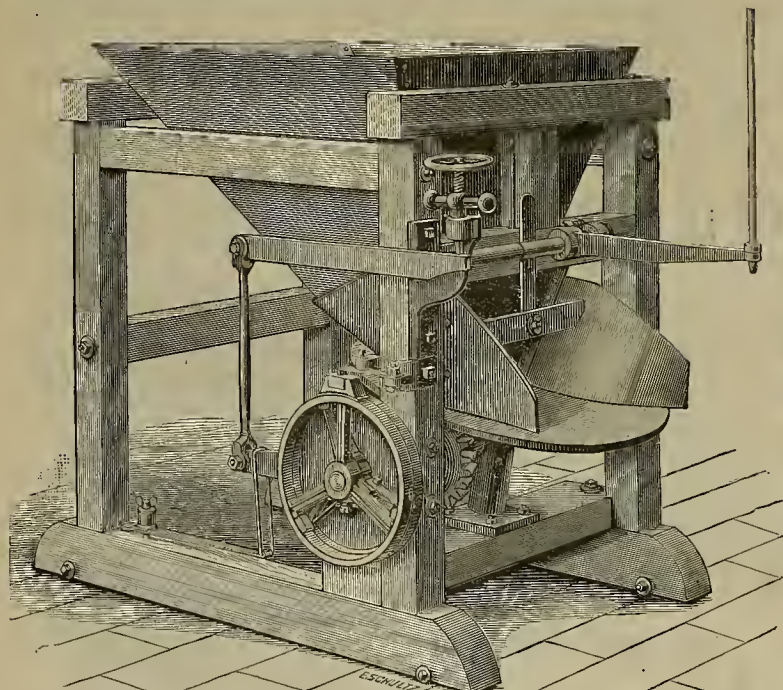
**THE PELTON WATER WHEEL CO.,  
127 First Street, San Francisco, Cal., U. S. A.**

A. P. BRAYTON, JR., General Manager.

L. A. PELTON, Consulting Engineer.

## JOSHUA HENDY MACHINE WORKS,

Nos. 39 to 51 FREMONT STREET, SAN FRANCISCO, CAL.



"HENDY" IMPROVED "CHALLENGE" ORE FEEDER.

The best form of Feeder ever devised, and pronounced by reputable mining men to be far superior to any form of "Roller" Feeder manufactured. We refer to the following gentlemen who have furnished us with testimonial letters to the above effect, which can be seen at our office, viz:

N. W. CROCKER, Supt. Bunker Hill Gold Mining Co., Amador City, Cal. | D. C. WICKHAM, Taylor Mine, Greenwood, Cal.  
W. G. ROBERTS, Greenwood, El Dorado Co., Cal. | J. R. TREGLOAN, Supt. South Spring Hill Gold Mining Co., Amador City, Cal.

WE ARE MANUFACTURERS OF THE

"CHALLENGE," "STANFORD," "TULLOCK," & "ROLLER" FEEDERS,

And will furnish descriptive Catalogues and quote prices upon application.

## THE RAND DRILL COMPANY,

23 PARK PLACE, NEW YORK,

Are now so situated with their new works as to offer to the miners of the Pacific Coast small Air Compressing Plants at such prices that almost any small mine can afford to put in power drills if they have none in use.

By their new and patented systems (by which the duty or performance of drills is not reduced with use) it is no longer necessary to buy a Compressor of double capacity than the drills are expected to require, in order to keep up the supply of air necessary on account of the wear of drills and compressor.

Besides having the newest and lightest designed small drill plants, the Rand Drill Company, as is well known, has built, and is now building, the largest Compressor plants in this country, and has patterns for all sizes up to 40-inch diameter of cylinder.

In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

Since the reasons which formerly restrained them from the California market no longer exist, they are now in the field for the business.

SPECIAL ATTENTION is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.



### ARE YOU GOING TO PUT UP MACHINERY OF ANY KIND?

Are you going to make any change in machinery? Are you freighting by team or packing on mules? Do you want Pulleys on Shafting already up? If so, don't fail to look into the merits of

THE DODGE PATENT INDEPENDENCE

### WOOD SEPARABLE OR SPLIT PULLEYS.

They are the Lightest, Strongest, Best Balanced and

Most Convenient Pulleys Made in the World.

Entirely new and original. Adapted to any power required. Time, trouble and money saved by using these pulleys.

Price List and Catalogues mailed free.

JOHN SIMONDS, Pacific Coast Agent, 509-513 Mission St., S. F.



### SQUARE FLAX PACKING,

Manufactured from strictly first-class Flax and pure lubricants. Superior to all others for Water and Steam. Packs with less friction and makes a tighter joint than any other packing made. Limitations of inferior quality having been put upon the market, we have been compelled to adopt the above trade-mark, and all of our packing will now have a RED CORD running through the center its entire length. See that you get it and take no other. Sold by all Hardware dealers. Price, 50 cents per pound. W. T. Y. SCHENCK, Sole Manufacturer, 222 and 224 Market St., San Francisco, Cal.

## SIERRA LUMBER CO.,

MANUFACTURE AND DEAL IN

Doors, Windows, Blinds,  
SUGAR PINE, YELLOW PINE, SPRUCE and FIR LUMBER.

Cor. Fourth and Channel Sts., San Francisco.



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, JUNE 9, 1888.

VOLUME LV.  
Number 23.

## Transmission of Power by Means of Electricity.

The transmission of power by means of electricity had its birth at the Vienna Exposition of 1873. The distinguished French electrician, Fontaine, there tried one Gramme dynamo as a generator of electricity, which he conducted to another Gramme dynamo, which was used as a motor in another part of the building, after having failed to get an electric battery, which he had provided for the purpose, to run the motor.

This was done after sleeplessly studying the matter over a whole night. He increased his circuit until there was more than 1½ miles of wire in it, and the motor ran a pump with "great success." It now seems strange that this had not been done before, as dynamo and electric motor had been known then for over 30 years. Fontaine's experiment effected the transmission of a part of the power applied to drive his dynamo to the electric motor which ran his pump. That which was 15 years ago a great scientific discovery is to-day a practical, every-day matter-of-fact, in a great many places, not alone in San Francisco, but in many of the cities of the United States and Europe.

From time to time we have made note of these applications of electricity in the columns of the PRESS. But now the matter comes nearer home. This publication is printed on a press run by an electric motor, and our customers, subscribers, friends and visitors are brought to our editorial and publication room by an elevator worked by like apparatus.

This power, supplied to us by the Pacific Power Company from a distance of several city blocks, leaves nothing to be desired. It is steady, cheap, noiseless, odorless, free from dust, ashes and dirt, reliable and "altogether lovely." We are going to describe it for the benefit of our readers, and point out some of the many advantages electric power has, not only in the cities and towns, but in the mines and mills of the country.

The engraving shows one of the electric motors made by Prof. N. S. Keith, the well-known electrical engineer of this city. Those operated by the Pacific Power Company were made by him, and this company has adopted them as the best after a long and exhaustive trial.

The massive frame of the machine is an electromagnet. An electromagnet is a piece of iron surrounded by coils of insulated wire which, when in operation, carry a current of electricity. The current of electricity, so flowing, makes the iron magnetic; one end of the iron has north polarity, and the other end has south polarity. These ends, no matter what the shape of the iron, are called respectively north and south poles. In this machine, or motor, each of the poles embraces about one-third of the armature. The armature is the cylinder shown inclosed at the right-hand part of the engraving. The end of the magnet above the armature is the north pole. That is to say, that is the end which is attracted by the north magnetic pole of the earth. The other end, which is below the armature, is the south pole. The side of the armature next to the reader has north polarity, and the opposite side has south polarity. These four polarities are conferred upon the magnet and armature by the current of electricity which flows from the source through the wires surrounding the magnet and armature.

The armature is a cylindrical electromagnet. As the like poles of two magnets repel, and the unlike poles attract each other, it follows that, as the armature is free to rotate on its axis, it must rotate in the direction from the north pole and toward the south pole on the side next the reader, and oppositely on the other side, and that continuously if the conditions be preserved. To preserve the condition in the armature, an instrument called a commutator, is provided and mounted so as to rotate with the armature. The commutator is the small cylinder at the left of the armature. In this particular case this commutator is made up of 60 sectors of copper, each electrically insulated

There seems to be no practical limit to the sizes. We have not the space at this time to devote to an exhaustive consideration of this subject. That belongs to the specialist in electrical science, but we shall ere long publish more about this great modern development. At present we are recording the accomplished fact.

More than a year ago the Pacific Power Co., a corporation which rents rooms and power to many customers on Stevenson street, in this city, started, experimentally, the transmission of power by means of the Keith dynamos and electric motors. After some months' trial and thorough investigation of it and other electric-

night in lighting, but which lies idle during the day.

We have noted in our columns from time to time various electric-power applications in mining localities, either proposed or executed. Now as to the possibilities. This method of transmission of power is extensively available in California and the States and Territories through which run our vast mountain chains. There are many mines located on mountainsides and tops which are almost inaccessible for fuel supply, and often without water for steam when even fuel can be obtained. There are many mills located at undesirable points away from the mines, where they have been put in order to have suitable power. There are many mines which would be worked were there power available for hoisting, pumping, milling, etc. There are many mining districts in which there are abundant water-powers unavailable for mining and milling on account of locality. The electric transmission of power furnishes the means for overcoming these existing difficulties. In this way power can be transmitted up, over and down mountains, into mines, tunnels, shafts, drifts, hacks, everywhere; to run mills, pumps, hoists, drills, locomotives, etc.

Power companies can locate dynamos at the available water-powers, and transmit the power by means of the dynamos, wires, and motors to the places where wanted, and in the desired quantities in the several places, even though they be miles in all directions apart and away from the water-power. It seems like a tale of the Arabian Nights. But it is not fancy, it is fact. Wherever fuel is dear, or at all difficult to obtain, and water-power can be had within a few miles, that power can be transmitted for use in place of that from fuel.

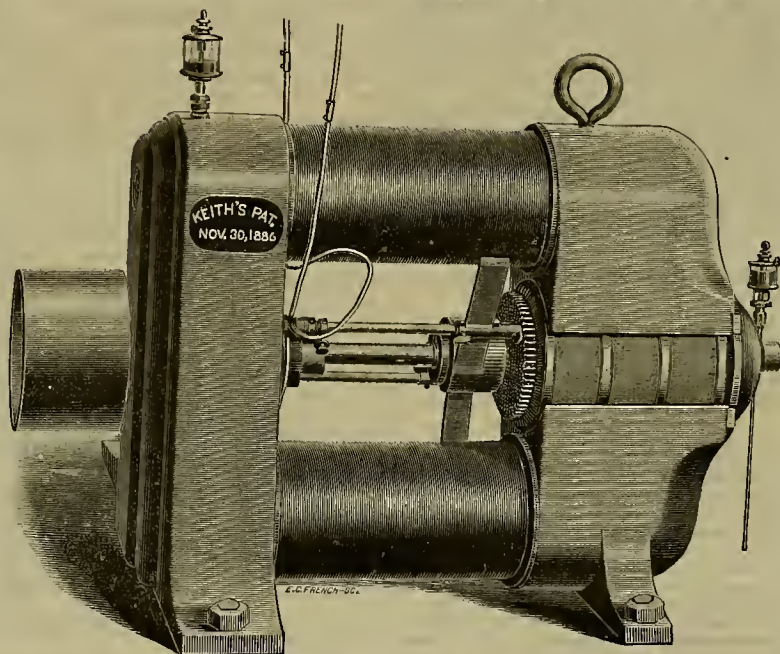
In another number of the PRESS we will consider the two methods of electric power transmission. Meantime we advise our readers to send to Prof. Keith, (whose card is in our advertising column), for his circulars, etc.

ACADEMY OF SCIENCES.—At the last meeting of the Academy, Prof. Josiah Keep of Mills' College demonstrated a newly discovered but simple method of finding the capacity of water tanks, tubes, cylinders, pans and pails, and other containing vessels. Prof. L. A. Lee, Chief of Staff of the United States Fish Commission on the steamer Albatross, made a gossip and entertaining address, in which he briefly described the voyage of the Albatross, the adventures of the party, their methods of work and deep-sea dredging.

THAT SUTRO TUNNEL SUIT.—The suit brought by John Landers and others, former trustees of the Sutro Tunnel Co. to set aside the election of Theodore Sutro, P. H. Lillenthal and others of the present trustees, has been dismissed, a demurrer to the complaint having been sustained by Judge Wilson, and the plaintiffs having failed to amend their complaint within the time allowed them.

A CORRESPONDENT of an Oregon paper announces the re-discovery of the Lost Cabin mine in the vicinity of the Lookout mountains. An old shaft has been found in which was an old rusted pick and a four-foot ledge. Three human skulls are said to have been found near by.

THE man who is building the great smelter at Tacoma is Dennis Ryan of St. Paul. The machinery will soon arrive.



KEITH'S MOTOR FOR ELECTRIC POWER.

from all the other sectors except through the wire which branches off each sector to the wires of the armature. The electric current is conveyed to and from the armature through the springs or brushes which may be seen pressing with one end each of the two on diametrically opposite sectors of the commutator. The electric current which actuates the armature enters it through the brush near the reader, and by the sector under the end of that brush. After passing from that sector through the wires of the armature it finds its exit through the diametrically opposite sector, and the brush which has one of its ends bearing on it. As the armature rotates the many sectors of the commutator come successively under the brushes, and in that way the electricity flows into and out of the armature wires always at approximately the same places in space, though at continually changing points on the armature. This preserves the polarity of the armature at constant places in space, even though it rapidly rotates, because the poles of armature and magnet are continually pulled toward each other and repelled as well, according to the law of attraction and repulsion of magnets.

All other things equal, the strength or power of an electric motor is somewhat in proportion to its size or mass. Therefore motors are made of all sizes, from the smallest fraction of a horse-power to even a hundred or more,

power systems, the Power Co. adopted it as the best of any now known. In a recent circular the company states that it has now in operation two circuits of 40-horse power each, and has in active preparation a 200-horse power compound-condensing Corliss engine, dynamo, etc., to add to the plant. Over 400 operatives daily depend for work on the electric-power furnished by this concern. This number includes printers, jewelers, glove-makers, embroiderers, shoemakers, clothiers, sewing-machine agents, saddlers and harness-makers, spice and coffee-grinders, machinists, brass founders, etc.

That which is being done and is to be done in the way of electric transmission of power in San Francisco, can and will be done in other places; for the power is cheaper and in every way preferable to that from steam or gas. The whole equipment consists of large and economical boilers and engines running large dynamos from which extend wires to the many motors in the several localities where power is used, often at great distances apart and from the dynamos station. The Power Co. supplies the motor, wires, electricity, attendance etc., at a contract price per month, leaving nothing for the user to do but to put oil in the oil-cups and pay the price. In other places the electric light companies seem to be likely to have the best possible conveniences for this work; because they have a power capacity which they use at



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents. — EDS.

## Placer County Mines.

## A New and Promising Quartz District.

EDITORS PRESS:—For some years past but little prospecting has been done in Placer county, that is, so far as quartz is concerned; but now the ledges that traverse this section of California are receiving more than ordinary attention, and the probabilities are that the quartz fields of Placer county will, in the near future, command the attention of the mining world.

The Ball mine and the property operated by the Zneraft Bros., located but a few miles distant from Newcastle, are both unfolding well, and give promise of becoming fine ore producers when necessary developments will have been placed on their respective properties. To-day they are both paying enterprises, but as yet development is only in its infancy. Valentine Bros., San Francisco capitalists, are prospecting a valuable gold-bearing quartz property within a short distance of the town of Newcastle, and from present indications it will not be long before reduction works will be erected and the mine operated upon its merits.

Drs. Schnabel and Berry are also placing improvements upon a recent discovery that upon the surface shows handsomely, and if the present flattering prospect has a home deeper in the ground, it will unfold into a mining enterprise of the most encouraging and profitable character. Dr. Schnabel is a public-spirited man, and takes an absorbing interest in the developments of our mineral resources and is ever ready to lend a helping hand and launch his money into underground developments where surface indications warrant an investment. Your correspondent has only mentioned a few of the prospects that exist in this immediate neighborhood, merely for the purpose of showing that our quartz fields are not entirely neglected, but that an interest is still taken in the development of such properties.

The eastern portion of the county, however, is where the future quartz bonanzas will be opened up. Here the indefatigable prospector has not been idle, but to the contrary, has penetrated the deepest recesses of our mountainous country, and there sought for the precious metal that has lured our mining-men, in the face of the most discouraging obstacles and dangers, to those fields that gave promise of becoming gold producers. This newly discovered district is one of the most promising, and is possessed of greater surface merit than any mining field that has been opened up in California for many years. In the vicinity of Auburn, and in the low hills that skirt the Sierra Nevada range, pocket hunting, with but few exceptions has been the nature of the mining engaged in, but this sort of work is uncertain, and in fact so precarious that none but expert prospectors, or those who recklessly invest their money care to face the desperate chances that attends such mining. In the new district alluded to the ore bodies are continuous, or exist in paying chutes or chimneys, and the man who invests his money in such properties does so with the firm assurance that his ledge is permanent and the ore bodies in them of such dimensions as to preclude the possibility of a failure. This new and promising gold field is located in the mountainous country lying between the middle and north forks of the American river, but a short distance from the old Last Chance district. In early days it will be remembered that a large quantity of quartz gold was taken from the placer mines in this vicinity, and it was this fact that influenced prospectors to search for the ledges that fed such claims. That their efforts were amply rewarded is substantiated by the rich and valuable discoveries they have made, ledges that have shown decided improvement as depth was attained, and though development is as yet only of a meager type, the properties operated are unfolding in the most encouraging manner. The ledges are strong, healthy and well-defined, showing every indication of permanency and range in width from four to seven feet, and in some instances are much wider. The formation is slate and of that nature that guarantees a sure home for the handsome veins that traverse through it from north to south. The country rock is bright, highly mineralized and does not show any indication of having suffered in any manner by internal convulsions or glacial action. It is, figuratively speaking, "rock in place."

The two most prominent mines at the present time are the Nimrod, operated by Glece & Corey, and the discovery claim known as the Leopard. The showing in both properties above mentioned is of the most flattering nature, and even though no other discoveries had been made would insure a bright future for the camp and be a source of wealth to their respective owners. Both mines are most advantageously located for thorough and rapid development, but so far only limited work in the shape of shafts has been performed. The owners, as is usually the case, are poor men and their labors have been principally directed toward proving the ore bodies they have encountered, and not with a view to opening their mines in a systematic manner. So far as this work has progressed, however, results have been of the most gratifying nature, so much so,

in fact, that negotiations are now pending for the erection of a mill on each property. The main vein in both locations varies in width from 7 to 10 feet, but within the same locations and distant from the main ledge 100 feet, is another equally as rich, and four feet in width. Both veins are pitching toward each other, the larger one at an angle of 20 degrees and the smaller one at 45 degrees. It will thus be seen that a confluence of the two ledges will take place at no great depth, where an extensive and rich body of ore will surely be encountered unless one of the heretofore infallible indications in quartz mining proves to be a failure. The gangue in both veins is composed entirely of quartz, all of which shows a paying average of rock and improving in richness as work progresses. No piece of ore can be taken from either of these properties that does not yield a paying prospect, and the character of the rock is such that improvements can be placed upon them rapidly and at light cost. In the immediate neighborhood is an abundant supply of the finest timber for mining or building purposes and also a sufficient quantity of water at all seasons of the year for milling purposes. In fact, every natural facility exists for the successful working of the mines, and it is only a question of a short time when reduction works will be running and a permanent and heavy gold-producing camp will be established. In winter the snow falls to the depth of several feet, but will not interfere a particle with operations in the mines, if those operating them have the forethought to lay in their supplies and make necessary preparations for the winter season.

Every mining man who has visited this promising district has pronounced it one of great merit and that it will sooner or later become one of the leading quartz fields in the State. The fact that the ore is in a manner continuous, and that the ledges from wall to wall will pay to work, is sufficient to recommend them to those who mine. This season a great amount of work will be performed in this district and it will also be thoroughly prospected for new discoveries. Gold properties are in demand, and such mines as are to be found here will find ready buyers. A mill or two planted in this district will very soon bring it into prominence, and the probabilities are that such works will be in operation before the season ends. The gold is entirely free and is generally diffused through the rock, and the ledges are of such dimensions that no wall or waste rock need be moved in forwarding improvements or in extracting the ore bodies. More information will be furnished your readers regarding this district before the season ends. MINER.

Newcastle, Placer Co., Cal.

## San Bernardino County Mines.

[From our Correspondent.]

It is now nearly three months since I wrote you regarding the mining interests of this county, since which time considerable progress has been made, especially in this neighborhood.

## The Black Hawk Mines.

Some 30 miles east of Victor station, on the California Southern R. R., which was undeveloped when I wrote you, has since been pretty thoroughly prospected and has proved of even greater magnitude than I predicted.

The owners (J. B. Cook, O. G. Leach and J. E. McFee) have had a force of men working the past three months on their "Lookout" mine. They have run two tunnels of 100 feet each at points on the ledge some 300 feet apart, besides numerous cuts, drifts, etc. This mine now shows a body of ore in face of the work done (the ledge lay almost horizontal) some 20 to 50 feet in thickness, exposing a solid mass of ore of over 200,000 tons.

The ledge has been cut across at the end of each tunnel, and in one of the tunnels at 50 feet, demonstrating the width of the vein. The surface of this claim shows a chimney of ore over 1000 feet in length, which has been cut by an immense canyon exposing the ledge for that length.

The owners claim that this unparalleled body of ore will fully average \$10 per ton. It is certainly the most extraordinary deposit of ore that your correspondent has ever seen. The fine ore of this mass washes perfectly free without reducing to pulp, giving extensive panning results. A strange feature of this wonderful ledge is that they have not used any powder in all the work they have done—not even one blast. The facilities for working could not be more advantageous; the mine will never require any hoisting works, nor can it ever be troubled with water. There are numerous strata of rich ore throughout the mass running from \$100 to \$500 per ton of free-milling gold.

Besides this mine they have several ore bodies on their numerous claims, showing a ledge surface of nearly equal magnitude and some very high-grade ore.

I understand it is the intention of the owners to ship some of the ore to San Francisco at an early date, so as to thoroughly test it.

It is quite impossible to describe this ledge, some two miles in length, with five or six immense chimneys of ore averaging 20 to 60 feet in thickness. Numerous assays were shown me varying from \$20 to \$500 per ton. Everything indicates another Comstock.

## Dry Lake District.

A Mr. Donham has purchased the mines and mills of Banta & Co. of this district and has

started out with men and provisions to commence operations. Dry Lake is situated about 50 miles East of Victor station on the California Southern and contains a number of small gold ledges.

Murphy & Crandall are said to have sold their carbonate mines at Soda Lake for \$15,000 to San Francisco parties.

## In the San Bernardino Mountains.

The Valley Gold Company of Holcomb valley has struck rich gravel in their new shaft. Mr. A. Del Mar, the managing director, has arrived from England with a view of pushing the works more extensively.

Burnap & McFadden are making arrangements to work some of their numerous ledges in Holcomb valley this summer.

J. B. Osborne's mine and mill has not commenced operations as yet.

A Mr. Phillips and associates have struck some rich pay gravel in Lyne Valley at the depth of 20 feet, but struck too much water for hand work, and is about to make arrangements for pumping apparatus.

It is rumored that a syndicate consisting of Capt. Haley of San Francisco, J. B. Osborne, the well-known mining man, McFadden of Santa Ana, Goucher of Los Angeles, Burnap of Holcomb valley, and several other gentlemen, with a view of tunneling under Holcomb and Bear valleys for the purpose of exploring the great mineral belt known to exist in the mountain range, and for the further purpose of draining and working the extensive gravel beds of Holcomb valley, utilizing the water obtained on desert land in the vicinity.

Bear valley is becoming quite a summer resort, especially for the citizens of San Bernardino and surrounding country. A new hotel is being erected by Knight & Metcalf. There can be no finer climate during the hot summer months.

There is quite an army of prospectors in the mountains and desert, especially along the supposed route to be taken by the Utah railroad. Victor P. O. C.

## Lower Springs Mines.

EDITORS PRESS:—Perhaps the following items may be interesting to your many readers. I will endeavor to give you some information relative to the recent activity in gold quartz matters. Conant & Co. have made several runs upon ore from different ledges here. The quality as well as quantity is satisfactory to all concerned and many hatches from other mines are waiting their turns. Conant & Co. are now prepared to work ores by a dry crusher. They will then roast and work through pans. Their process includes only rebellious ores. They also have a wet crusher. The particles pass over copper plates and over Dodge concentrators. But what we miners are praying for is a first-class pan or pulp-mill in our midst. The reduction works at Redding are six or seven miles from our most valuable ledges. We have a large quantity of low-grade ore in and about our camp, and the grill being very fine will require a pan and settler process in order to work the ore up to a high percentage. This latter process is required at least on ores from the croppings. When we reach the water level the ore will carry a much higher percentage of sulphurets and will require concentrators. The gold ore upon our croppings is very fine and is of a rather free-milling proposition. This pan process works well on all croppings of ore. It matters not if the ore is a little rebellious.

We are waiting patiently for some moneyed party to erect a first-class mill that will save our gold up to the proper per cent; then our miners, with renewed vigor, will pitch in and demonstrate to the public that we have mines here in this partly forgotten camp.

Lower Springs, Shasta Co. I. C. FRICK.

MELBOURNE EXPOSITION.—J. C. Lea, a merchant and mining man of Melbourne, arrived in this city a few days ago on the steamer Alameda. He has come here to examine California methods of quartz mining. He speaks highly of the coming exposition at Melbourne, and says: "If the people of the Pacific Coast could realize with what interest the people of the Colonies look forward to a sight of their exhibit at the great exposition, they would exert themselves to the utmost to make it the best possible. California products have a ready sale now, but the different industries and products of the States and the coast have never been properly brought before the notice of the Australian people, and now that the merchants of San Francisco have an opportunity of presenting their goods in such a manner that it will reach all the people under the Southern Cross they will be lacking the shrewdness and acumen that is conceded to them by the whole world if they do not avail themselves of it."

EIFFEL'S tall iron tower continues to mount toward the sky at Paris, where it is to be one of the most interesting features of the coming exhibition. There are those who predict it will fall before it reaches its full height, but the constructor assures all that there is no danger.

THE new cable put in the Chollar mine, Virginia City, to drive the electric light power, weighs five tons.

## The New Almaden Quicksilver Mines.

From an account of a visit to the New Almaden quicksilver mines, Santa Clara county, published in the San Jose Herald, we condense the following:

Towering mountains clothed in living green rear above us, while at their base flows the clear sparkling mountain stream, upon whose banks the broad shady road winds its way up the canyon. Along the beautiful roadway are scattered many cottages and some elegant homes, all of which are simply buried under a hower of roses and bright flowers of every hue.

The residence of the president, J. B. Randol, is one of the most charming spots that can be found in many a day's journey. The grounds are beautifully arranged and planted to all kinds of fruits, vines and flowers, making it a veritable Garden of Eden.

Many have been told of the bondage and hardships to which the miners and their families are subjected in this mining town. If he slavery to live in one of those rose-borrowed cottages at the nominal sum of \$2 to \$5 a month rental, with free pure mountain water, then enslave us at once. If ever there should be a happy and contented lot of workmen (and they all seem to be), it should be at the Almaden mines.

By the advice of the gatekeeper we first went upon the Hill. The grade is very good but quite steep, and the view that can be had is one of the grandest that can be obtained of Santa Clara valley.

After 30 minutes uphill work we reached what is called English Camp. This is a village of Cornish miners and is a colony as distinct and separate from its surrounding neighbors as if it were planted upon an island in mid ocean. They have their church, school and public hall.

The auditorium is of good size and the stage is large enough to accommodate a good-sized troupe. It is furnished with plenty of comfortable chairs, card-tables and a splendid piano. Here the miners meet of a Sunday or of an evening to while away the hours in reading, chatting and playing various kinds of games.

From here we kept onward and upward to Spanish Camp, which, as its name indicates, is a similar camp to English Camp, except that its population is composed of Spaniards.

We passed on by the old deserted Washington shaft to the American shaft, where we camped.

The officer in charge of the American shaft took charge of us and showed us through his department. In this shaft the water is 400 feet deep and they keep a pump running day and night to keep it to that level. The entire mountain is honeycombed with miles and miles of tunnels, cuts and crosscuts, there being upward of 30 miles of underground work.

There are the Washington, American, Buena Vista, St. Isabel and Randol shafts, all excepting the first being connected by tunnels and underground ways. Some of these shafts are over 2000 feet deep and one of them is 500 feet below the sea level. In this the temperature is very high.

Any lover of mechanics will be well repaid for his trip by visiting the pumping and hoisting works at Buena Vista and Randol shafts. The people of Santa Clara valley will never duly appreciate the work of this company until they go and view the million dollars' worth of machinery and material that have been wagoned up these hills. By the energy and enterprise of this company we have one of the greatest industries of the world brought right to our doors and hundreds of thousands of dollars poured out in our midst every year.

The mining of quicksilver is far from being as profitable as in years past, and it is only by the application of the most improved methods that it is made to pay at present prices.

About the time we had finished our lunch the New Almaden band gathered together and marched to our camping place and treated us to several pieces of as good music as it has been our fortune to listen to for many a day.

We now started down the hill to the reduction works. These are situated at the base of the hill and cover an immense area, and there is enough here to consume an entire day at sight-seeing. All the ore from the various shafts is wagoned to the brow of the hill and then let down to the works, by means of an inclined cable railway, right into the upper story of the building, thereby saving the hauling of it a long distance and also the elevating of it to the top of the works, where it begins its journey in the reduction process.

Here it is that President Randol has made the most radical changes for the benefit of his company. Every appliance of skill and science has been brought into use, and to-day the New Almaden mines are worked on the most scientific and economical system of any mine in the world, with the exception of the labor. This of course costs much more than in the old countries, the wages ranging from \$2.25 to \$4 a day for laborers and averaging over \$3.

We cannot refrain from mentioning some of the changes he has made. For instance, when he went there they used great brick furnaces holding many tons of ore which they would fill, and then seal up the top with masonry and clay. Then a fire would be kept up for four or five days and then they would have to let them cool off to remove the rock from which the quicksilver had been evaporated. This of course was a very slow process, requiring much labor and entailing great loss of time. The



furnaces are now constructed on an altogether different plan. They run day and night, Sunday or Monday. Every hour they dump in a carload of ore at the top and take a load of rock from the bottom. A small stream of pure quicksilver is constantly running into an iron basin, from which it is ladled out into a scoop balanced for 90 pounds, from which it is funneled into an iron flask and tightly sealed.

The novice is very much surprised after viewing the white heat of the furnace and seeing the solid ore thrown in, to go to the hose of the furnace and see the melted silver stream running out, to find that he can hold his hand in the liquid without being burned. The most surprising thing to the stranger is to view all those shafts, pumping engines, hoisting works, hundreds of men employed in mining, teams and cars used in mining and transporting ore from the mines to the furnaces, acres of furnaces and miles of piping, and nothing to show for this great outlay of labor and capital but a tiny stream of bright silver that you would guess you could carry away in a bucket at night.

The appliances are so perfect that they now work as paying ore the old dump piles that at first were thrown away at the mouth of the shafts as worthless stone and dirt.

The managers of these mines have spared no expense to render the working of the mines healthy to their laborers, and to-day no healthier spot can be found than this mining town. The entire smelting works are kept as clean as a housewife's kitchen. They have a perfect system of water works and fire protection. Everything, both inside and out, shows evidence of the executive ability of President Randol and the watchful eye of the superintendent.

### Steam Arastras.

The steam arasstras which Gray & Miller have put up at Gold Hill are attracting much attention and are worthy of careful investigation by other claim-owners in that locality. The capacity of their boiler and engine is 10-horse power. It runs two arasstras with four drags each, also a pump that lifts water from a well 30 feet in depth to a tank which supplies the arasstras. They have attached a novel and effectual mode of crushing ore to their main shaft, which consists of a cam, bolted to a flange which is keyed to the shaft and set so as to operate a vertical bar of railroad iron, held in position by wooden guides and operated in a manner similar to a stamp-mill. All the work has been done by the owners in a neat and workmanlike manner, and it is so arranged that one man can attend to the work with ease while the other is occupied at the mine. This little plant through all its details reflects credit on Gray & Miller, whose capital consisted entirely of ingenuity, pluck and energy. While shipping ore from their mine all they could make was a living, and, not content with that, they took a load of ore to Tom Knot's arastra to see what could be done in the line of working their ore in camp, and, as the cost of working it in an arastra is a mere trifle compared with that of shipping it, and the returns more satisfactory, they determined to try the experiment, and the result is a grand success, because they are making money and are independent. While their little enterprise is regarded with great favor by their fellow prospectors, it is thought that they will soon be classed as bloated bondholders, because their mine is a good one. Knot charged them \$8 for working the little hatch of ore on which they made a test and gave them \$60 as the returns. Now since they have commenced to work ore themselves they don't talk much but look to be very happy and don't seem to care a continental for capitalists.—*Western Liberal, N. M.*

**THE DRY CONCENTRATORS.**—Harry E. Sharp, who has had charge of the machinery in the splendid concentrating mill at Seligman since Mr. Hewitt's departure, stated to a *Eureka Sentinel* reporter that the machinery is all running and doing its work in a very satisfactory manner. He is the master machinist who, under S. R. Krom in New York, constructed the concentrators and other most valuable parts of the machinery, and who, at the special request of Eugene N. Robinson, was sent to Seligman by Mr. Krom to take charge of its erection in the magnificent mill, and to start the machinery in motion. Mr. Sharp said that the plant is perfect, and the machinery is running smoothly and to the entire satisfaction of Mr. Robinson.

**THE Helena Assay Office** has received more gold-dust during the present year than it did up to this date during 1887. At least \$40,000 more has been deposited since January 1st than during corresponding months of last year. The number of deposits for this year are 276, as against 226 for last year. The gold comes principally from Idaho and various sections of Montana.—*Helena Independent.*

The Comstock mines lead the world in the amount of dividends paid. There are 46 mining companies whose shares are at present quoted on American stock exchanges that have severally paid \$1,000,000 or more in dividends. These companies paid in dividends to date over \$230,000,000. Of this amount about a dozen Nevada companies alone have paid over \$120,000,000.

### Gold Ores Containing Lime.

The following article on "Roasting and Chlorination of Gold Ores Containing Lime," was written for the *Engineering and Mining Journal* by J. H. Burfield, M. E.:

It is not my intention to treat the above subject in a general way, but simply will call attention to a few facts which may be of interest.

A sample of concentrates from a large lot was handed me with the following remarks:

Why is it that these concentrates if roasted without salt will only yield about 50 per cent of their contents of gold to chlorine gas?

What is the cause of uneven results if roasted with salt?

Why is it necessary to add salt?

Ferricyanide test is used to ascertain if a "dead roast" has been obtained before any charge is removed from the furnace.

I made analysis of the concentrates, found them to be pure iron pyrites (no arsenic, antimony, copper, lead, zinc, etc.), with 14 per cent of silica and 2 per cent of lime, which latter was present as calc spar.

I roasted two samples in a muffle, one with and the other without salt, treated the roasted material with chlorine gas and bromine water. Only a trace (72 cents) of gold was left in either sample. Roasting with or without salt took the same length of time to obtain a dead roast.

I concluded that salt was superfluous, but the fact that if roasted on the large scale without the addition of salt only 50 per cent of the gold can be obtained remains.

I referred to Kustel, Aaron and other authorities, and found the statement: "Salt must be added if lime or talc is present in the 'gangue.'" Nothing more. The answer to the question, why, is not given.

The fact that even with salt the results were not uniform, and that frequently tailings would contain a large amount of gold, even when the test made with ferricyanide indicated a "dead roast," convinced me of the unreliability of that test if lime is present in the material under treatment. It does not indicate either the presence or absence of sulphate or sulphide of lime; in fact does, therefore, not give the slightest indication if the salt has fulfilled its work for which it is added.

I obtained a sample of tailings containing about \$5 of gold; treated them with an excess of chlorine and also of bromine; no gold could be extracted. Analysis proved the presence of lime either as a sulphate or sulphide, which I did not determine. Ferricyanide indicated the total absence of ferrous salt. I then re-roasted the tailings with salt, determined the chloride of calcium in a portion of it, and when nearly all the lime present was left as a chloride, I again subjected the tailings to chlorine and bromine. Result, only a visible trace of gold was left.

To ascertain therefore to a certainty that a charge is ready for the chlorination tub, it is necessary to determine exactly in what shape the lime remains. Ferricyanide will only indicate the absence of ferrous salt, and if this test is only used the results must be unsatisfactory for reasons given above. Tests made on material worked on a large scale verified the above to my satisfaction.

Text books state that if lime is present it will remain in the roasted material as sulphate of lime. I experimented with chlorine, bromine and sulphate of lime; found reaction very slow indeed.

Added sulphate of lime to the roasted material, treated it with bromine water and chlorine gas; results, tailings as low as without the sulphate of lime. "The day began to dawn."

Roasting in a muffle the charge does not get in contact with the fuel or the gases thereof, the carbonate of lime is converted into sulphate of lime, the heat obtainable in such furnace will not decompose it, it remains as such. It does not interfere in the subsequent treatment, consequently I obtained as good results without salt as with it when I roasted the material in the muffle. It is different if the material is roasted in a reverberatory or cylinder furnace where the charge comes into contact with the fuel or gases thereof. The lime is first converted into a sulphate, but part of the carbon burns at the expense of the oxygen in the sulphate, and the sulphide of calcium is left. And here comes the difficulty. Unless this sulphide is entirely decomposed, no satisfactory results can be expected in the leaching vat. If chlorine or bromine come in contact with sulphide of calcium in presence of water, hydrogen sulphide will be evolved, and this gas in turn will precipitate gold already in solution as sulphide of gold. Kustel states that this makes no difference, as it will be re-dissolved by the excess of the chlorine. I beg leave to differ. It is not re-dissolved by any excess that may be used, but is invariably lost with the tailings unless they are re-roasted and re-treated. This statement I base on several tests made, and also on the fact that such material worked on the large scale gives the same result if treated for 36 hours or 72 hours, with any amount of chlorine gas that will be absorbed.

Some writers claim that the lime remains in the calcic state, the chemistry of which is not plain to me. That it is not the cause of the trouble in the above case, I hardly need mention.

**Resume.** To use the Plattner process on material containing lime, it is necessary that no

sulphide of calcium be present in the material when it enters the leaching vat. To ascertain this to a certainty, see that the lime present is in the shape of chloride, if the roasting is done with salt in a furnace in which the charge comes in contact with the fuel or gases thereof. In case the ore is roasted without coming in contact with the fuel or gases thereof, sulphide of calcium will not be formed. No addition of salt is required, and any test indicating the presence or absence of ferrous salt will answer fully.

I have purposely avoided giving equations, and rehearsing well-known theories I thought superfluous, which will explain many seeming omissions in the above.

### Gold on the Yak.

This is indeed the year of mining discoveries, for almost every day we hear of some wonderful quartz or gravel find, and what is still more strange, all these mysterious whisperings in the ambient air all seem to emanate from the great ters incognita to the north of us. This region of sharp mountain crags and wild torrents which go seething and roaring through deep gorges and over weird cataraets, finally swelling the grand Columbia, has been known since '59 to be rich in golden sands, at which time a party of three prospectors left Bonner's Ferry for the then new Kootenai mines and got lost in the mountains, and finally reached Kootenai through the assistance of friendly Indians. Their tales of placer finds are well remembered by the old miners at Kootenai at that early day, among them Hon. Louis Lee, a resident of this place. In fact they told stories of finding nuggets as large as a hen's egg, and although the men showed three or four nuggets of virgin gold in corroboration, still the miners believed that the gold was obtained from the Sullivan creek placers, now known as Metaline, where Roger Sullivan, Chas. Deitz (recently of Rathdrum, but at present of Colville) and other prospectors obtained such an enormous quantity of gold, \$15,000 or \$20,000 each, within a few weeks. The men tried for some time to get together a party large enough to stand off the Indians and return to the place where they found the gold, but they received no countenance whatever. Winter soon came on, and the people of Kootenai came near starving to death, a 50-pound sack of flour being worth \$100, and small things like rich placers a hundred miles away and the snow 20 feet deep were lost sight of in their great necessity for grub.

In 1884, R. E. Spronk, who was hung in Victoria for the killing of Tom Hammil, went on a prospecting trip up the Yak river, which empties into the Kootenai 65 or 70 miles above Bonner's Ferry, and he informed the writer that he had found a bar on the Yak, 15 miles from its mouth, that was fairly lousy with gold, yet we deemed his statements the empty vaporings of an idle brain. Yet the poor old man, long since in the presence of his God, evidently told the truth and nothing but the truth of the great gold-fields on the Yak.

Later news from this region confirms all former reports as to its inexhaustible stores of the precious metal, both quartz and placer deposits, and those best acquainted with the ground predict a bright future for the last great find in the northeastern part of Kootenai county.

E. G. Pond, a prospector of much experience, and well known in Northern Idaho, was all over the Yak country and speaks in glowing terms of the great mineral wealth of that region; of glittering gold where 10 cents to the pan can be obtained at the grass roots and where are many gravel banks 25 feet high which will average that sum to the pan; in other words, now that miners are going in in sufficient numbers to afford ample protection from roving bands of hostile Indians, there is a great gold field thrown open to the prospector, with millions of dollars of glittering ore in sight. This is in the same region where Dick Fry had a gang of Chinamen at work last fall, and also near where Bill Keeler discovered his big quartz lodes and placer diggings which average \$5 per day to the man.

The Yak is quite a large stream, being about 40 miles long and 200 feet wide at its mouth. It rises in the mountains which separate British Columbia from Idaho, and has plenty of fall for the working of the gravel banks, which are very rich. Bedrock has never been reached, and what can be found there when the gravel is so very rich is only a matter of conjecture.—*Kootenai Courier.*

**CENTRIFUGAL AMALGAMATOR.**—The first *Coeur d'Alene* test of the centrifugal amalgamator was concluded here yesterday, and Mr. Day, who had charge of it, pronounces it an unqualified success. Seven tons of Occident tailings were run, and a sufficient amount of free gold was obtained to demonstrate that the machine will accomplish what is claimed for it. It certainly saves a very large percentage, if not all, of the free gold and the concentrates. To-day a run of 10 tons of tailings from the Treasure Box will be commenced.—*Coeur d'Alene Record.*

ONE of the Baku, Russia, oil wells recently produced 55,000,000 gallons in 115 days. The greater portion was lost, because there was no apparatus to control the output, which flowed away into the river.

### Missonla River Mines.

The New Camp. The Surrounding Country and Bright Prospect of the Mines.

From X. S. Barke, who has recently returned from the new camp on Missonla river, the *Wardner News* gathers the following facts:

At this season of the year the only way to reach the camp is from Horse Plains, on the N. P. R. R. From that station the old Cedar creek trail leads over the mountains to the Missonla river, thence up the river to Cameron's Ferry, on the old Mullan road, where a crossing is made, and then follow up the road easterly along the river about eight miles to the mouth of Spring creek, up which the mines are situated about three miles. The country is broken up by steep mountains, but, unlike the *Coeur d'Alene*, there is but little underbrush or fallen timber, and grass grows in profusion everywhere, making it a paradise for prospectors or hunters.

A little town called Solomon City has been started, now consisting of about a dozen completed and as many more half-finished log houses, one of them containing that inevitable primary enterprise, a saloon. Surrounding the town for a space of probably two miles square, are the mining locations which were discovered last fall. Thus far but little work has been done upon them, still a few have sufficient development to justify the belief that the camp has a brilliant future.

Prominent among these is the Iron King, owned by Phil O'Rourke, Harry Boyer, Frank Tibbals, John Cromie and others, which has a shaft about 50 feet deep showing a large body of sand carbonates, which assay well and are, no doubt, over 20 feet wide. The ledge crops out in places for the entire length of the claim, making it probably the best showing in the camp.

The Keystone, owned by the same parties, and lying about a quarter of a mile north from the Iron King, is a high-grade gray ore, with a tunnel 60 feet long exposing a vein 31 feet wide. Assays from this mine run up into the hundreds.

The Little Pittsburg, lying about a mile south from the Iron King, owned by our townsmen Gove and Crane, L. Davenport and others, has a shaft 100 feet deep showing a vein 2½ feet wide, in which they now have at the bottom of the shaft 20 inches of very high-grade ore; at least 12 inches of this is clean gray copper, assaying over \$350 per ton. They now have about 35 tons of shipping ore on the dumps, and are making arrangements to ship it out at once.

There are numerous other good prospects in the camp, but development is not sufficiently pushed upon them to warrant an opinion as to their extent or richness. Transportation can be had down the river to the N. P. R. R. with a small outlay of money, and the signs are all wrong if this is not a booming camp before fall.

### Australian Mines.

J. C. Lea of Melbourne, who recently arrived in this city, in an interview spoke as follows:

"The alluvial diggings, as you know," said Mr. Lea, "were very rich in Australia, similar to the California placer diggings of '49, but they have been worked out, and now we have to go deeper and tap the quartz ledges underlying the alluvial. So far we have met with success, but have been handicapped to a great extent by the want of requisite machinery. I am going to examine thoroughly into the workings of the quartz mines of this State and report the result of my labors to the Ministers of the Government, that they may recommend the best methods of reducing ore to the mine-owners of the colony."

"All the mines in Victoria are gold mines, and very rich, some of them producing ores worth from five to two hundred ounces to the ton. Of course, we have wildcat mines, the same as you do here, which are floated on our Stock Exchange, but their run is almost over. Their dupes are getting to be very scarce, and the people who invest in mining stocks are becoming cautious."

"The principal mines in Victoria are at Ballarat, Sandhurst and Iron Bar, where shafts have been sunk to the depth of 2000 feet."

"I shall go East to examine into the working of a new amalgamator in use in Pennsylvania. On my return I shall visit the Utah and Colorado mines, and then finish my journey by a visit to the Comstock."

"The large silver mines that were discovered two years ago at Broken Hills, New South Wales, about 160 miles from Sydney, from the present outlook, promise to be some of the best producing mines in the world. The output now, although in its infancy, is about 2000 ounces a month."

**WORK ON MINES STOPPED.**—Judge Sawyer in the United States Circuit Court has granted an injunction to Maria A. Valentine against Samson D. Valentine and others, restraining them from taking any gold bearing or other ore from the Little Pine Tree, Big Oak Tree, Wherry or Golden Eagle mines, situated in Placer county. The complainant is to furnish \$10,000 bonds, and the injunction holds until a further order of the court is made. The complainant is plaintiff in a suit of ejectment at present pending in the United States Circuit Court.





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SAN FRANCISCO

Saturday Morning, June 9, 1888.

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#### Business Announcements.

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#### Passing Events.

The men in the St. Lawrence mine, Butte, had a very narrow escape on Sunday, and it was a piece of good luck that only one life was lost where such an extended cave occurred. If the telegraphed accounts are correct, the managers had been warned of the dangerous character of the ground, and precautions should have been taken to prevent accident.

It will be noticed from what is said in another column that the MINING AND SCIENTIFIC PRESS is now being printed on a press run by electric power. The use of this power is very rapidly extending in this city, and is found of great convenience.

The excitement concerning the Lower California gold mines appears to be over. It was only local in character, being mainly confined to the southern part of the State.

The mining season in Alaska is reported as backward this year, and thus far very little work has been done. Efforts are being made to sell some of the Alaskan quartz mines in the London market.

A great deal of mining machinery is being made in this city for shipment to the Australian colonies. They are having quite a mining boom over there, and are importing a good many American appliances for working ores.

Work has commenced on the railroad to connect Spokane Falls with Coeur d'Alene.

#### Sowing the Wind and Reaping the Whirlwind.

Judging from the accounts that reach us from Australia, there is likely to occur in that country one of those mining-stock excitements of the kind that in times past so sorely afflicted the Pacific Coast. This Australian craze grows, we take it, out of the silver discoveries lately made in Queensland and perhaps other of the provinces. The papers that advise us of this movement, while affecting to deplore it, seem ready at the same time to justify it in part through the lame excuse that few other openings offer for the profitable investment of capital. Hence the readiness with which multitudes appear ready to embark their means in mining shares, and this, notwithstanding they well know the prices at which these securities are selling, are altogether fictitious, and that a grand collapse must eventually ensue.

It is, in fact, but a repetition of what has so often happened here in California, only that there has usually been with us something more substantial on which to base our ventures than these colonists have yet been able to point to. There was something so royal in the discoveries made on the Comstock and they hurried so suddenly on our vision that we could, for a time, hardly help being dazzled with their glamour, their phenomenal output of bullion at the start having been calculated to heighten an undue confidence in the future of these mines.

Then, too, the Californians were novices in this kind of business. They knew at the outset nothing about its allurements and dangers—nothing about the inside plotters and the outside claquere—the artful stock-johner and the wily manipulator, the wash sales and the lying reports. They had all this to learn by experience, and it must be confessed that it took them a good while to reach such an understanding of it as has since led to a general abandonment of this perilous field of speculation.

Having now seen the "elephant" and from actual inspection gained a realizing sense of the size and the crushing powers of the brute, it ought not to seem impertinent on our part if we tender our neighbors in the land of the kangaroo and the boomerang a bit of advice, founded on our experience in this most reprehensible and dangerous style of gambling. To begin then, let us tell them that the two States of California and Nevada have, in our opinion, suffered more from these stock operations than from any other one thing, intemperance alone excepted. We might even aggregate the losses that have come of several notable evils, such as drouths, floods, fruit pests and blighted vineyards, and scarcely would their sum total equal the money values that have been swallowed up in this class of transactions.

Thus much for the pecuniary aspect of the case: If we take account of the moral and social mischiefs directly traceable to this cause, we shall find ourselves confronted by an evil the magnitude of which baffles comprehension—an evil, too, that cannot, like money losses, be palliated or repaired. If the men who are responsible for and have profited by these raids on the community at large were ever so willing and even desirous of making amends, they could not do so because they could not bring back the suicide to life, reinstate the fallen, cure the incurably insane or replace the lost earnings of the countless poor. This is all on record and cannot in any jot or tittle ever be altered or effaced! That it is so is a fearful thing to contemplate, and ought to cause one meditating an indiscriminate robbery of this kind to hesitate before doing that which can never be undone and for which he can make no reparation. This must, we opine, be the unpardonable sin we read of, because it is a sin that can never be atoned for.

If, now, these colonial peoples, warned by our experience, would take care to avoid our mistakes, what of tribulation, disappointment and loss, to say nothing of soul ruin and social wreckage, might they not escape! Like causes produce like effects. As disaster has come to us, so will disaster come to them if they follow in our footsteps. To persist in the course they seem to have entered upon is but to sow the wind with the certainty that they must reap the whirlwind. These Australians have valuable deposits of the precious metals and many of them. Let them be persuaded to avoid stock-gambling and work these deposits in a

sensible, business-like way—in such a way that, instead of being a curse, they will prove a blessing to their country.

Addressing these words of caution to communities so far away does not imply that our own people have been so thoroughly cured of the evil here inveighed against as to no longer require any word of admonition or warning. Fooled and fleeced as they have been, let hut another honanza be uncovered on the Comstock and the inevitable craze ensue, and there is reason to fear a good many of them would betake themselves again to this miserable business, submitting to be shorn just as clearly and just as cruelly as ever before. Let a market be made for the uncaged wildcat, and we shall see these covetous and credulous people ready to hazard their means in the same foolish and reckless manner as of old—that is, such of them as happen to have any means left. Like the votaries of the gaming-table, the habits of the mining hourse are apt to become so infatuated with the business that hut rarely do they ever get quite cured of their love for it.

#### Protecting and Preserving Piles.

On this coast, where the ravages of the teredo and limnoria are so destructive to piles and other wood used in salt water, numerous inventions have been tested as a means of prevention. The question is a very important one, as in some places the "life" of a pile is not more than three years, when it has to be replaced, entailing great expense. The latest inventions to protect and preserve piles are those just patented through the MINING AND SCIENTIFIC PRESS Patent Agency, by Charles C. Lane of this city, who has assigned his rights to John H. Boalt. One of the inventions consists in splitting the pile substantially in the direction of its length and throughout that portion which is to be exposed to the attack of marine insects, leaving the remaining or top portion, where strength is required, unsplit, and in treating the split portion of the pile with a suitable protecting or antiseptic compound. The compound, entering the splits or cuts, fills them up and permeates the substance of the pile. The teredo will not cross the cut or splits, and can only work in the solid portion, which is so thin it cannot carry on its operations; nor can it come to maturity or even live in the narrow substance between the piles.

The other invention consists essentially in incasing or covering the immersed surface of a pile with a sheathing of wood which has been previously prepared by pricking or puncturing it, by subjecting it then to a bath of some light preservative or protective material whereby its open pores are caused to absorb said material, and by finally sealing the punctures or openings in it with a heavier material. The exposed surface of the wood is first covered with a protective material or coating, such as asphaltum and sand, then securing over said coating the sheathing of wood prepared as described, and then covering this sheathing with an outer coating of material similar to that forming the inner coating. The advantages of this application are that the inventor attains a preservative and resistant sheathing or jacket for the pile without weakening the pile itself, as would be the case if the punctures or holes were made directly in the pile in order to apply this treatment. The prepared sheathing need not be applied direct, but in some cases a box may be made of the sheathing so it may be fitted over the pile, and the space filled in with proper protecting material.

THE Carson Mint is now turning out monthly, in fine bars, silver to the amount of 160,000 standard ounces, and about 10,000 ounces of gold. The gold hugs in the East, and other enemies of silver, can no longer manufacture capital by the cry that the Comstock bullion is transported past the doors of the Mint for reduction at private smelting works in San Francisco, for the institution is now running to its fullest capacity. So great has been the increase of deposits that it has been necessary to erect nitric acid works, which will increase the refining capacity about 60,000 ounces per month.

THE coinage at the Mint in this city during May amounted to \$1,613,000. Of this all but \$208,000 was in gold—\$1,360,000 in double-eagles and \$45,000 in \$5 pieces. Of the silver, \$150,000 was in standard dollars and \$58,000 in quarters.

#### May Dividends.

The dividends disbursed during the month of May last by our various local incorporations, mining, fiscal, industrial and otherwise, reached a total of \$662,670, against \$422,990 for the corresponding month of the preceding year. Of this amount, \$108,000 came from the Con. California and Virginia mine, being over 16 per cent of the entire sum paid out. The Hale and Norcross, another Comstock company, divided among its shareholders \$56,000, being the third largest dividend made, and the first declared by this company for the past 17 years.

Although net earnings have been so long intermitted, the work of searching after pay ore has been kept up in the Hale and Norcross quite steadily during all these years, current expenses having been met by assessments levied on the shareholders. That it should at last be making some net returns is a noteworthy event, as giving hope that other of these Comstock mines in which assessments have been taken on the chronic form may yet some day bring to the patient and long-suffering shareholders a like agreeable surprise. These two are the only mines on the Comstock that are at present paying dividends.

But while so few of these mines are just now in honanza, affairs over there would seem to be in a tolerably healthful condition. If so few of the companies are making any net profits, quite a number are paying their way under heavy outlays for development, the assessments levied by each are any thing as onerous now as formerly. But the most encouraging feature in connection with the business of mining in that region is the extent to which stock gambling has subsided, giving way to more careful management and economical methods of working. By reason of this the situation along the entire Comstock range ought to be considered satisfactory, as compared with some epochs in its past history.

That there still exist minor abuses in connection with the conduct of these mines there is no question. But for these the shareholders in the several companies ought to be able to find correctives. But in no event can this class of evils affect the general public as do these speculative movements, the last of which, let us hope, has been seen on this coast. Looking back a few years it really seems incredible the extent to which nearly all classes of people were carried away by these stock excitements. They amounted to a species of insanity.

Just think of it! The Comstock mines dealt in on the stock-board selling in January, 1875, at a valuation of \$262,000,000—in January, 1881, at a valuation of less than \$7,000,000! a shrinkage of more than \$255,000,000 in the course of six years; a large percentage of this loss having been incurred by people in moderate circumstances. No wonder the masses are poor; nor is it at all a wonder that a few men in the community are excessively rich. Let there be made no more millionaires by this cruel and senseless process.

#### Foundry Notes.

The big steel casting of the stern-post of the cruiser San Francisco has been removed from its mold at the Pacific Rolling Mills and pronounced perfect by Lieutenant Gilmore, the Government Inspector. In about a month from now the ram for this cruiser will be cast at these mills. The stern-post just completed is the largest casting of the kind ever made in America.

It is expected that the cruiser Charleston, now being completed at the Union Iron Works, will be ready for launching by the 4th of July.

The Risdon Iron Works are building a very large quartz mill for the Ilex gold mine, Calaveras county.

The Joshua Hendy Machine Works are turning out just now an unusual number of "Challenge" ore feeders.

The Fulton foundry has on hand a number of compound marine engines for use in coasting vessels.

Parke & Lacy are having built considerable mining machinery for Australia. Among this are several Dodge crushers and pulverizers.

PARTIES who have returned to Benton, M. T., from Sweet Grass, on the reservation hills, bring examples of fine gold from placers discovered there. They report an abundance of the precious metal. Quite a stampede has commenced to the hills.



**"Hazleton" Tripod Boilers.**

We herewith present an illustration of the special form of the "Hazleton" tripod boilers, built by the "Hazleton" Tripod Boiler Co. of Chicago, Ill., for which the Joshua Hendy machine works, of Nos. 39 to 51 Fremont street, this city, are the agents for the Pacific States. These boilers develop in their construction several novel features, and it is claimed that their operation has fairly demonstrated that they are practically the safest and most economical steam generators yet devised for the following reasons, viz.:

The central column of these boilers being vertical, as will be observed from the cut, permits

area of these parts naturally performs the duty of steam dryers. In other forms of boilers the temperature of the steam is due to the pressure carried, whereas in these the steam is hotter than the temperature, due to the pressure as it passes through all of the tubes above the water line before leaving the boilers.

The gain from this important factor of construction is obviously great, as the steam is thereby rendered dryer and hotter, thus enabling the connected engines to cut off at shorter stroke by reason of the greater expansion of this dry steam.

The large number of these boilers which have been placed in successful operation in the Eastern, Middle and Southern States of America has

**A Mine Accident.**

At the St. Lawrence mine, Butte, M. T., a serious accident happened on Sunday last. While the miners were gathered at the station to go to the surface, a heavy cave occurred, extending some 300 feet in length. It is said that experienced miners have regarded the place as dangerous, and a number had quit work and refused to work there. The men who were at work on the 200-foot level at the time of the accident had all arrived at the shaft to be drawn up, with the exception of four on that shift who had been delayed in placing some drills. The names of the victims in the cave-in are James Gooley, Michael Sullivan, Patrick O'Neil,

their long imprisonment. The body of Tim Harrington was recovered Monday evening. He was caught in the drift and his life crushed out when the cave occurred. There will be a thorough investigation of the cause of the accident.

**Quartz Mining Activity.**

The increased activity in quartz mining in this State and on this coast is very noticeable this spring. From all sides come accounts of the development work going on, the relocating and reworking of idle claims, increased work on old and opening of new ones. In California mining is conducted on an entirely different basis from what it was 20 years ago. The system is no longer "top-heavy." Fancy salaries are not paid to kid-gloved superintendents or other officers. The employees are now all expected to earn their salaries, and incompetent men are soon dropped. Affairs are conducted on business principles and economy is the order of the day.

We have learned, too, how to work our mines and treat our ores much better than we did. Mines are now worked at a profit that produce only ore that a decade since would not pay expenses. Means of transportation are better, labor more available and steadier, and supplies more easily procured. All the conditions are more favorable, and, moreover, people do not in these days expect to make their fortunes in a month or so. They are satisfied with smaller profits and a regular output. As a general thing the business is paying well.

The manufacturers of mining machinery and appliances in this city report an increased demand for their goods. As an instance, it may be mentioned that the sales of the "Challenge" ore-feeders have covered a larger number during the past month than in the same period since originally devised. The foundries are all busy and considerable mining machinery is being built and sold.

**The Lick Observatory.**

THE MINING AND SCIENTIFIC PRESS of next week will contain a complete and detailed description of the Lick Observatory, with some 40 engravings. The number has been some time in preparation, and will be found useful for reference and of general interest as well. The Observatory has been informally transferred to the Regents of the University and the further ceremonies of acceptance will take place at Berkeley on Commencement day.

The Observatory is not yet ready to receive visitors at night, as the Lick trustees are still engaged in work upon the elevating floor of the dome. When this work is completed, which will be shortly, visitors will be admitted according to the terms of the accompanying circular:

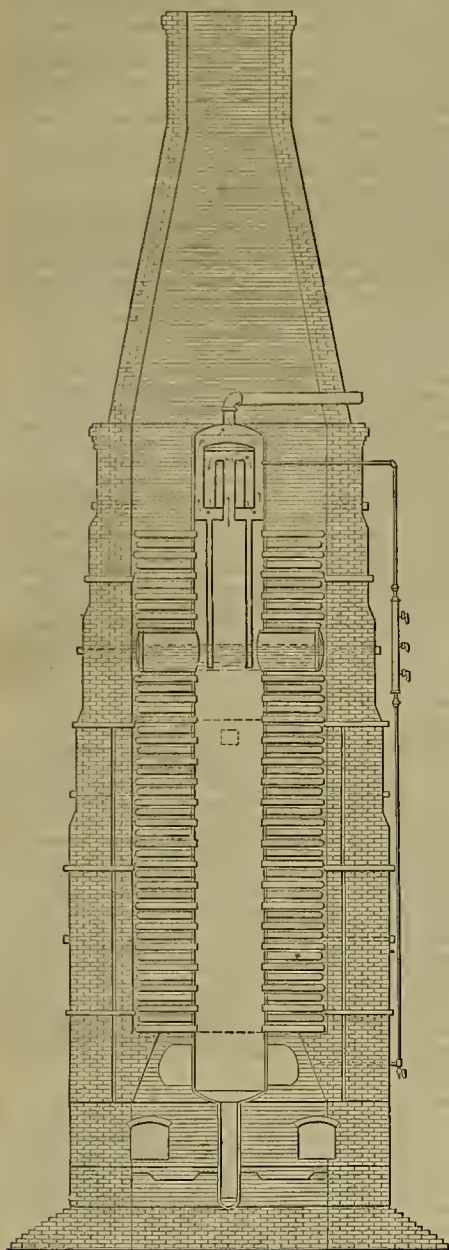
The Observatory buildings will be open to visitors during office hours every day in the year. Upon their arrival visitors will please go at once to the visitors' room and register their names. An hour or so can be profitably occupied in viewing the various instruments, and the rest of the stay can be well spent in walks to the various reservoirs, from which magnificent views of the surrounding country can be had. At least an hour and a half of daylight should be allowed for the drive from the summit to Smith creek. There are no hotel accommodations at the summit.

Within a few weeks visitors will be received at the Observatory to look through the great telescope every Saturday night between the hours of 7 and 10, and at these times only. Whenever the work of the Observatory will allow, other telescopes will also be put at the disposition of visitors on Saturdays between the same hours (only). At 10 P. M. the Observatory will be closed to visitors, who should provide their own conveyance to Smith creek, as there is no way of lodging them on the mountain. It is expected that by setting apart these times for visitors (which allow freer access to the Lick Observatory than is allowed to any other observatory in the world) that all interested may be able to arrange their visits in conformity to them; and that the remaining hours of the week will be kept entirely uninterrupted, in order that the astronomers may do the work upon which the reputation and the good name of the Observatory entirely depends.

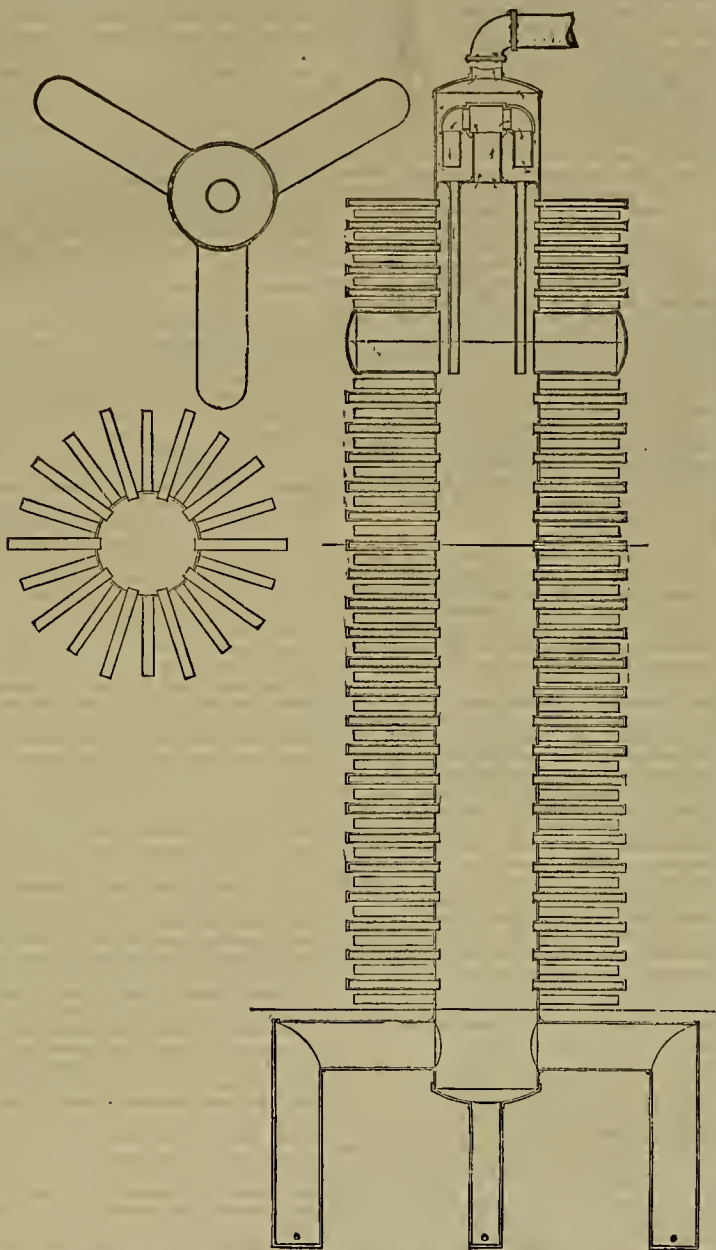
EDWARD S. HOLDEN, Director.

Due notice will be given when the Observatory is ready to receive visitors at night.

THE Crown Point mine in the Comstock for the last year produced 9026 tons of ore that milled \$10.74 per ton. There were also 810 tons which yielded \$13.53 per ton.



HAZLETON BOILER WITH BRICK WORK.



OUTLINE AND GROUND PLAN WITHOUT BRICK WORK.

all of the accumulating sediment in the water to be precipitated to the bottom of the column, by its own gravity, from whence it can be readily removed. It will further be noted that the radial arms are short, being only 24 to 36 inches in length, through which the circulation is necessarily exceedingly rapid. These radial arms are regular boiler tubes, having one of each of the ends closed while their other ends are expanded in aperture reamed in the central column. There can be no pull nor strain on the joints, as the tubes are made fast only at one of their ends, and can, therefore, expand freely upon the application of heat; and it will further be observed that the central column is also free to expand when subjected to the same action.

Another peculiarity will be found in the fact that the entire heat, generated from the burning fuel, is disseminated throughout the boilers, the whole interior surfaces of which are heating surfaces.

The large domes which are placed at the water line increase the water area and the steam is given off free from water. The parts of the boilers above the water line form steam spaces, and a large portion of the superficial

proven that by their use a saving of from 20 to 30 per cent in the consumption of fuel can be effected over any style of boilers yet introduced, and at any rate the manufacturers and their agents are prepared to guarantee this percentage of saving.

We deem it important to direct attention to the economy of space which can be secured in the placement of these boilers, and which is as follows: A boiler of 300-horse power requires a ground or floor space of 13 feet in diameter, or an area of say 133 square feet, and one of 500 horse power a space 17 feet in diameter, equivalent to an area of 227 square feet.

The manufacturer's agents have informed us that the first boiler of this style, built by Mr. M. W. Hazleton, the deviser, is now in constant operation at Eleventh street and East river, New York City, and several others of the same form have been added to the plant and been in use night and day during the last seven years, and no repairs have been required since having been placed in position.

DURING May there were 1691 flasks of quicksilver, value \$64,437, exported from this port.

and Tim Harrington. The men at the shaft were knocked down by the concussion and all were blinded by the dust. The mine connects with the Anaconda, which joins the St. Lawrence on the west. From the Anaconda side the imprisoned men were heard knocking on the air pipe, and the work of rescue was commenced at once. A large force of men were engaged in the work, and they changed off with a new set every few minutes. The work was necessarily slow as they were making an upraise through the caved ground, which kept settling and falling through almost like quicksand. When within about 50 feet of the drift in which the men were imprisoned they could hear the rapping of a hammer on the rock, and from a signal given it was made known that three men were there.

James Gooley, Michael Sullivan and Patrick O'Neill, three of the men imprisoned in the cave were recovered after 17 hours of constant work by foreman Michael Carroll and relays of rescuers. They had been communicated with by the rescuing party and furnished with whiskey through a pipe. None were the worse for



## MECHANICAL PROGRESS.

## Wood vs. Steel.

Which is the Stronger in Proportion to Weight—A Simple and Interesting Experiment.

The relative weights of wood and steel in proportion to their strength is a matter which probably not one out of 100 readers has ever had occasion to investigate. If the conundrum were propounded: "Which is the stronger—wood or steel?" ninety-nine out of a hundred would be likely to answer that steel possesses greater strength in proportion to weight than does wood. Experiments have recently been made in Ohio which show that wood weighing only half as much as steel will, when put under pressure, stand a greater strain than steel.

Take a piece of hard wood, ash for instance, and a bar of steel of the same length, and weighing twice as much as the wood, and subject both to the same breaking strain, the steel bar will be very much bent before the wood is thrown out of line.

This, says *Farm and Field*, illustrates an important fact which should be known to every farmer and mechanic, especially since there seems to be a disposition on the part of some manufacturers to change from wood to steel and iron. It was the pleasure of a representative of the paper named, while in Akron, Ohio, a short time since, to witness an experiment proving the above-mentioned fact.

A piece of ash, such as is used in the Buckeye machine, was placed in a clamp along with a piece of steel of equal length, the same as is used in all steel binders. The steel weighed just twice as much as the wood, and yet the steel invariably yielded and bent as the pressure was brought down. The wood was scarcely out of line, and when the clamp was removed it sprung back to its original shape. Not so with the steel. It not only bent under the pressure of the clamp, but remained bent when the clamp was taken off.

This, continues *Farm and Field*, is a clear illustration of the difference between wood and steel-frame binders. When an all-steel machine is brought into sharp contact with some unyielding obstacle, its frame is liable to spring, and when once sprung its usefulness is at an end. It cannot be straightened without resort to the shop for repairs. A wood frame is not thus affected. If bent under a violent strain, it at once springs back to its original shape. At the first glance it would seem that a steel binder is lighter than a wood frame, and that it possesses greater strength. But it is an instance in which appearances are deceptive. A piece of steel one foot long and a half inch square, weighs double as much as a piece of seasoned ash one foot long and 1½ inches square. In other words the steel, in proportion to bulk, is 1½ times as heavy as the wood. A steel frame of a machine which is one-fifteenth as large as a wood frame, weighs exactly the same as the wood. But even with this difference in size, the wood has four times the strength. These are simple problems which every farmer can solve for himself. He need not accept the word of any man whose interests would be subserved by having him believe one way or the other. Make the test yourself, and when an agent comes to you with a denial of this proposition, you can talk intelligently from personal knowledge.

## History and Manufacture of Ramrods.

Muskets were in use nearly a century before this country was discovered. The chargers were rammed down with wooden ramrods. It was considered a great step in warfare when, under Napoleon Bonaparte, iron ramrods were substituted for those of wood. The objection made to iron, which did not at that time seem fanciful, was that it was liable to strike fire and ignite the cartridge in driving it home. But daring investigators decided that this objection was more in the mind than in the matter. It was decided that it was not substantial, and iron prevailed. But even iron could be improved upon. The rods bent easily. Then the rods were made lighter and of steel, to which was welded a soft iron head. Soon after the advent of the Springfield rifle, the iron head was abandoned and the finely tempered steel ramrod, of the government pattern, which was used during the civil war, was adopted. Three quarters of a century have improved this article, from being a rude affair to being an exhibit of fine workmanship. Another quarter of a century, and further improvements may have ended its existence.

A good ramrod is really a work of art in design, and of wonderful skill in manufacture. The stock of each one is carefully weighed and cut from the bar. The head and the swell beneath it are then blocked out under the trip-hammer, and the long, slim, tapering rod is then drawn out with a pair of dies, which for the most part are nearly flat, under the trip hammer, which strikes about 400 blows per minute. There is no cessation of the stroke, for the heater has a hot one ready to be worked on as soon as the one which is being worked is finished. The hammer strikes the last blow on the finished one, and the next blow strikes the hot one. With a hammer running as this sped, the celerity, the accuracy and the judgment exercised are elements of a skill than which I know no greater.

After the rods are drawn down square, they

might be finished by rounding with a common pair of rounding and straightening dies, keyed in the usual manner; but the length is so great as to make it hazardous in practice, and other means have been adopted. These appear in the form of jumper dies, used under the trip-hammer. The least nick in the side of the finished ramrod will cause it to be condemned, for every rod is ground to the most accurate measurements.—*American Machinist*.

**COMPOSITION AND CHARACTER OF DELTA METAL.**—This metal, says an English scientific journal, is formed by the introduction of a small percentage of iron into copper-zinc alloys. Nearly a quarter of a century ago, Aich and Beren Rosthorn of Vienna perceived the high character possessed by this compound, both as regards strength and tenacity, but the matter remained in abeyance till recently. Its special features are the inability of rust to corrode it and the magnetic needle to become attracted by the metal. It is now placed on the market as an article of commerce. The specific gravity of Delta metal is 8.4—that is to say, it differs but little in weight from copper, while its melting point is 1800°. In color the alloy resembles gold or corrosion. The cost of which it can be produced is that of the best brass. The alloy can be worked both hot and cold; be rolled, stamped, cast, forged or brazed with equal facility. The castings are particularly sound and free from blow-holes—a frequent source of loss and annoyance with those made in brass—while possessing, it has been computed, three times the strength of brass casting. It can be used for parts of rifles, guns, torpedoes, tools for gunpowder mills, parts of bicycles, gongs, etc., formerly made of steel; in pump-work to supersede brass, and extensively in ship's fittings; in chemical manufactures, where other metals would rapidly corrode; in shutters, for bolts and nuts; proellers, anchors, cranks, cog-wheels; in harness fittings, spoons, forks, cups, fenders, vases and candelabra, and a large variety of other goods where handsome appearance is a desideratum. It therefore should have a great future before it in this country.

**LIFE OF IRON PIPES.**—The wear by rust in uncoated cast-iron pipes exposed to the action of clean, fresh water on both sides is not more than one-eighth of an inch in three generations. With the present method of protecting such pipes with asphaltum, the life of the ordinary cast-iron pipe used in building construction may be greatly prolonged. Indeed, even an ordinary coating of coal-tar pitch, when properly applied, is sufficient to add at least a score or two of years to its durability. The life of a soil pipe, even when quite thin and uncoated, has been found by experience to be so great that it is not unreasonable to suppose that the greasy matter contained in sewage serves to coat and protect the iron from the corrosive action of the water and the acid components of the sewage. The defects and leakages more generally met with in such pipes are caused by the defective manner in which the joints are made, and improper placing and securing. Wrought-iron pipe for water or gas mains does not seem to have the durability which cast iron possesses. Why this is so, nobody can probably explain. For service pipe, of course, wrought iron is preferable in case lead is not used, but the wrought iron should be galvanized to protect it from corrosion.

**ALLOYS FOR MAKING SPECIAL GRADES OF IRON.**—E. W. L. Biermann, of Hanover, Germany, has for many years made a specialty of the production of some rare alloys and metals for producing special grades of iron, steel and bronze. He makes ferrotungsten cast in ingots, running from 20 to 57 per cent; ferro-silicon-manganese, ferrotungsten-manganese, 5 to 10 per cent; ferro-aluminum, 5 to 13 per cent; ferro-silicon, 5 to 45 per cent; ferrochrome, 10 per cent; ferromolybdenum, ferrophosphorus, and 5 per cent ferrotitanium. He produces also manganese copper and manganese bronze, silicon copper and silicon bronze, alloys of tungsten, cobalt, nickel and phosphorus, with copper, aluminum, bronze, silicon-manganese bronze, nickel bronze and phosphorus bronze. He manufactures Wood's metal, having a fusing point of 73° C., and Rose's metal with 94° C. as the melting point.

**HORIZONTAL AND VERTICAL ENGINES.**—No other than the horizontal engine for screwships was used for many years in war ships on account of the necessity for complete protection, and the efficiency of the machinery arrangements was thus much reduced. Within the last few years, however, in large battle ships and some others, it has been found possible to sufficiently protect the cylinders of vertical engines from danger by projectiles, and this type of engine has in all such cases invariably been fitted. The advantage gained by the use of the vertical engine instead of the horizontal are very considerable, the engine working far more smoothly, wearing more evenly, and all parts being much more accessible for examination.

**STEAM POWER OF DIFFERENT COUNTRIES.**—Recent statistics of the amount of steam-power in use in different parts of the world make it appear that the United States consumes more power from stationary engines than any other country, the figure being placed at 7,500,000 horse-power, as against only 7,000,000 horse-power in England, 4,500,000 in Germany, 3,000,000 in France, and 1,500,000 in Austria.

## SCIENTIFIC PROGRESS.

## Messmerism or Hypnotism—Which?

A great deal of skilled time and attention is being spent upon the study of hypnotism, and the more careful the investigation, the greater the interest that is awakened, and the more men of first-rate position take a part in the inquiry.

Only a few years ago the so-called hypnotic phenomena were looked at askance, and those who dealt with it regarded as more or less knavish and silly. The late Dr. Esard, who believed in the reality and scientific value of trance-phenomena, was publicly insulted by English physicians for venturing to demonstrate his views, and the N. Y. Academy of Medicine subsequently made one of his insults, Dr. J. Oribton Browne, an honorary member. The fact that any man of scientific reputation was known to feel an interest in matters associated with "mesmerism" or "animal magnetism" was sufficient to make him an object of suspicion, and injure his good standing among his fellow-scientists, and the whole matter was left, for the most part, to charlatans and pretenders, whether they called themselves magnetic healers, Christian scientists, or any other fanciful name. But science, in the remarkable progress attained of late, has advanced so far upon certain lines, that it has been hardly possible to proceed further without entering upon the forbidden fields. The old sign-boards against trespassing have been taken down. For "mesmerism" (that verbal scare crow) has been substituted "hypnotism," which is mesmerism with a new Greek name, which name has had a wonderfully legitimizing effect, while "animal magnetism," that once flouted idea, has been proven to be an existent fact by methods as accurate as those adopted by Faraday or Edison.

Periodicals making a specialty of the subject are now published in France, Germany and England. A catalogue of the recent literature of hypnotism and related phenomena, compiled by Max Dessoir, occupies nine octavo pages.

Mesmer, no doubt, was an empiric; but he nevertheless, in spite of his exaggerated methods and bombastic nonsense, got at the truth. Dodge it, if you please, by hiding under the new name, yet the fact still remains that the phenomena of hypnotism are identical with those of mesmerism, and it is equally true that all the experiments of Dr. Luys, which appear in the translation by Prof. Castegnier, were made years and years ago, and that similar experiments are recorded in the works of Reichenbach, who invented, as an explanation of these phenomena or effects, what he called "od" or "odic" force.—*Medical Classics*.

**ARTIFICIAL DIAMONDS.**—Prof. Simmler brings forward the somewhat plausible theory that the basis of diamond formation is liquid or liquefied carbonic acid. Indeed, facts observed by different savants tend to show, it is said, the presence of this agent in the coating of the most valuable gems. Upon the bursting of such crystals there are often found to occur two liquids in the cavities, the one behaving like water, the other like liquid carbonic acid. On one occasion, indeed, it was observed that the liquid in a quartz crystal which was dashed to pieces scattered its contents around with a great noise, burning holes in the handkerchief wound around the hands of the experimenter. The acid contents had itself disappeared. Under these circumstances M. Simmler argues that if carbon be soluble in liquid carbonic acid, it would then only be necessary to subject the solvent to slow evaporation. The carbon would thereby be deposited, and, by taking proper care, assume crystalline forms, and in evaporation quickly the so-called black diamond, which, in the state of powder, is much used for polishing, the colorless diamond might be produced. Though the liquid in question has never been subjected to a chemical analysis, the formation of liquid carbonic acid in the interior of our globe may, it is admitted, be considered as highly probable.

**MORE OF PHOTOGRAPHING IN COLORS.**—The latest improvement in photography, as described by the Philadelphia *Inquirer*, is a process by which colors as well as objects may be photographed. By the use of three plates instead of one, three negatives are taken on plates specially prepared. These are exposed in a triple camera. In front of them "light-filters" are set, carefully adjusted, so as to admit to each plate the amount of light just requisite to impress on the negative the picture of such a color as will, when combined with the other two colored negatives, reproduce the desired color and light and shade of the object photographed. In a recent lecture Mr. Ives, the inventor, exhibited a photograph of a landscape, in which the different shades of green in foliage and the varied colors of sky, house and barn, with the rich orange of autumn leaves, were perfectly portrayed. This will work a revolution even in photo-engraving, while the composite photographic process, producing the fine lines of wood engraving, which the gelatinized zinc plate was not able to furnish, now rivals hand-work so accurately that the difference is not discernible except to the expert.

**THE NOSE AND THE BRAIN.**—Dr. Guye of Amsterdam has been making a study of nasal maladies and their effect on the brain. He

finds that a diseased nose is often the cause of inattentiveness and dullness in children. A dull boy became quick to learn after certain tumors had been taken from the nose, and a man who had been troubled with vertigo and buzzing in the ears for 12 years, found mental labor easy after a similar operation. In a third case a medical student was similarly relieved. Dr. Guye supposes that these nasal troubles affect the brain by preventing the cerebral lymph from circulating freely.

**NATURE FULL OF PARADOXES.**—It is the general understanding of scientists that warm air is in a measure a vacuum, and that cold air rushes into these vacuums, and, as it warms, it descends. But somebody has lately said that the cause of our Western cyclones is the warm air moving along the Equator, and through the Gulf of Mexico, and up the Mississippi Valley to meet the cold air of the North. This does not agree with the old scientific theory that cold air moves in the direction of the nearest warm air. When the mercury is away down below zero outdoors and 60° or 70° above in our room, the air of the warm room rushes up the chimney with great force to meet the cold air outside. At the same time that this process is going on, if we raise our window an inch, a strong current of the cold outside air will rush in, exactly contrary to what is going on in the chimney. The world of nature seems to be full of paradoxes. If we stand before a mirror, we see our right side on the left, and the left side on the right. Now when we see ourselves thus, why don't we see ourselves head down and our feet upward. Why is there this difference between the perpendicular and the horizontal?—*Germantown Telegraph*.

**EXPLOSIONS GENERATED BY SAWDUST.**—Enormous deposits of sawdust in the Ottawa river are making trouble, not only threatening to close navigation, but, owing to explosions of gas generated from decomposition, vessels are sometimes thrown into the air. Mr. Arnold, chief mechanical engineer of the Public Works Department at Ottawa, speaks of seeing as many as three explosions of this sort in a single week. He was surprised that there had not been some loss of life on this account. A difficulty was likewise experienced by the steamboats on the Ottawa in keeping their pumps in order, owing to the sawdust getting into the machinery. Sawdust could be dredged out and lowered into barges and got rid of by being dumped into deep water. Sawdust, however, would have to be carried on shore and either dried or burned, or thrown into deep gullies.

**MAGNETISM OF METALS.**—"Shelford Bidwell (Royal Society, March 1st), is continuing his admirable researches on the changes produced by magnetism in the lineal dimensions of the different magnetic metals," says *Nature*. "He finds that iron, which first expands with the magnetizing force, soon reaches a maximum point, whence it contracts until it attains its original length; but on still further increasing the magnetizing force it contracts until it apparently reaches a minimum point, beyond which his means have not enabled him to proceed. Bismuth appears to continually expand, nickel to continually contract, while cobalt contracts, reaches a minimum point and then expands, approaching its original length. Manganese steel was unaffected. His apparatus was so perfect and sensitive that he could read a variation of one hundred thousandth of a millimeter."

**CONVERTING ELECTRICITY INTO HEAT.**—It is announced that several patents have recently been issued to a Baltimore electrician covering improved methods and apparatus for heating by electricity. The inventor, it is claimed, has made a radically new discovery in the method of converting electricity into heat, whereby the losses incident to all previous efforts in that direction have been practically overcome. By this system it is claimed that dwellings and other buildings can be supplied with heat from central generators by the same conductors which now supply them with incandescent electric lights, and at a cost considerably less than the method now in vogue.

**CHEMICALLY PURE ZINC BEING MADE IN NORTH CAROLINA.**—The Piedmont Reduction Works are in successful operation. Capt. Crolemlire, the energetic superintendent, is making chemically pure zinc. We are informed that this is the first and only place in the world at which this has been done. Capt. Crolemlire discovered the process and has it patented here and in Europe. He has been offered \$100,000 within a few days for his patent for the United States excepting North Carolina, and has declined. These works and their practically successful working are of inestimable value to the world.—*Thomasville (N. C.) Gazette*.

**A NEW PROPERTY IN SULPHUR.**—In its ordinary condition, sulphur is one of the best insulators, i. e., one of the worst conductors known. M. Duter, in some experiments at the Sorbonne Laboratory, has, however, shown that when raised to its boiling point—about 836° F.—sulphur is capable of transmitting an appreciable current of electricity. With electrodes of gold, connected to a battery of Leyden jars, a current was obtained having the mean value of 1-8000 amperes.

**WHAT IS LISLE THREAD?**—Lisle thread is a fabric that is woven from ordinary linen thread that has been first of all twisted.



## USEFUL INFORMATION.

## Cases of Spontaneous Combustion.

In a factory in New Jersey, where oiled stock for planes was operated on by boring, planing and mortising machines, causing shavings and fine particles of wood, which were saturated with linseed oil, to collect on the floors, it was noticed that a great increase in the temperature took place when the sweepings, which had been moistened by sprinkling, were collected in a pile. On a subsequent occasion it was found that a barrel of shavings and chips from the boring and mortising machines were so hot as to be almost ready to ignite. Another barrel contained shavings made in planing oiled stocks. On these being moistened with water they soon began to heat, and the temperature continued to rise until the next day, when it was found that the shavings began to char. The barrel was covered with a metal plate until the next day, when, on being disturbed, the mass burst into flame.

In a manufactory of plane-bits a sponge had been used to transfer the water by capillary attraction from a water-box to an emery-wheel on which the bits were ground. The sponge wiped off the fine steel particles from the wheel, and they were collected in the sponge and kept constantly wet. The sponge was finally laid aside, and after a week or ten days it was discovered that the mass was spontaneously ignited, and if it had not been for its timely discovery another mysterious fire might have resulted.

Some years since a gentleman was experimenting in coloring Southern moss for decorative purposes. In one of his experiments he used a very thin paint, or varnish, but slightly colored with a pigment. He dipped the moss in the mixture and then squeezed out as much as possible by hand. The result not proving satisfactory, he threw the moss in a box and placed it in a closet. A few days after the odor of something burning led to the discovery that the moss was charred and almost ready to ignite.

In the manufacture of a cement or putty composed of whiting and boiled linseed oil, which, after being ground in a mill, was put in barrels, a fire was discovered under one of the barrels standing on end. The floor was partially burned through when the discovery was made. In grinding the oil the mass became warm from the friction, and a small part of the oil had leaked through the common barrel while in this warm state. It was discovered in time to prevent much damage.

A number of hales of sea-island cotton stored in a warehouse in New Jersey were found to be on fire. When the fire was extinguished at one spot it would start at another. The cotton had been ginned on a roller gin, which, in cracking a portion of the seed, had caused the oil in the seed to become mixed with the cotton, and the result was spontaneous ignition.

An engineer placed a bunch of waste—which had collected in cleaning up a mill—in front of a boiler, in order that the fireman might use it the next morning in starting up the fire. During the night it spontaneously ignited, set fire to the kindlings which had been made ready for the morning, and raised steam sufficient to blow off and alarm the watchman.

## Edison's New Phonograph.

Mr. Edison has so much faith in his new phonograph that he has just constructed works for its manufacture on a very extensive scale. The factory is 600 feet long by 75 in width. He, Edison, claims to have perfected a phonograph by which the human voice is repeated, and, by means of a wax impression on the "reproducer," wax copies or the original cylinder may be mailed anywhere, to be repeated from another phonograph. "We are now able," said Mr. E. to a reporter, "to put a phonograph cylinder at the telephone and make it talk to some one in New York by wire."

A reporter describes the apparatus as follows: The "talking machine" of a dozen years ago has disappeared, but the principle remains and is now in the form of a practical commercial invention as well as a pleasing toy. There is a motor box about 11 inches square and the armature in it is only a horizontal ring or wheel of metal, with 10 pole pieces at regular intervals on the rim. The "cat power" battery is in a separate case underneath. The phonograph is a separate arrangement, attached to the motor-box by two screws. There is a small shaft four inches long, with 100 threads to the inch, which feeds what looks like a pair of spectacles with a receiver and transmitter in one ring. Then there is a recorder in the form of a steel knife fastened to the diaphragm. The receiver is a delicate metal needle, which operates on a phonograph blank of white wax. This blank is hollow and tapers inside so as to bind by friction in hot or cold weather on a metal drum. A second shaft has a coarse reverse thread and is only used where repetition is desired. On the surface of the little wax blank, which looks like an ivory dice-box, can be recorded from 1000 to 1200 words or several musical compositions. A wax blank can be automatically pared from 15 to 20 times for new records. When in motion the phonograph looks very much like a turning lathe.

A CLOSET finished with red cedar shelves and drawers is death to moths and insects.

**TRANSFERRING PICTURES TO GLASS.**—To transfer a lithograph or printed picture of any kind to glass, so that it will be visible from both sides: Give the warmed glass an even coating of Canada balsam or varnish; place the surface of the print on the surface thus prepared when the varnish is partly dry, but still sticky, smooth it out and let it stand in a cool place until the varnish sets; then apply water, and with a soft piece of India rubber or the finger tips rub off the paper so as to leave the image on the varnished glass.

**HOW TO STAMP A LETTER.**—Out of the millions of persons who stamp letters daily, but few know the way to do the "licking." The envelope should always be licked and not the stamp. If you lick the envelope and then apply the stamp, it will stick, sure. If you lick the stamp, you are liable to carry away too much of the mucilage on your tongue, or so much that the stamp will fall off. Many a letter has reached the Dead Letter Office because the sender licked the stamp instead of the envelope.

**A GOOD LIQUID GLUE** is made by taking a wide-mouthed bottle, and dissolving in it eight ounces best glue in one-half pint water by setting in a vessel of water and heating until dissolved. Then add slowly two and one-half ounces strong nitric acid of 36° Baume, stirring all the while. Effervescence takes place with generation of fumes. When all the acid has been added, the liquid is allowed to cool. Keep it well corked and it will be ready for use at any moment.

**TO KILL THE SMELL OF PAINT.**—It is said that the smell of paint, which is frequently so unpleasant in both a new house and one that has been freshly done up, is easily removed by means of a few armfuls of thoroughly damped hay, which should be laid loosely about the rooms and passages and left for 24 hours, after which it may be taken away, and if necessary replaced by another lot.

**STEEL IN A SHIP OF WAR.**—The steel required for the United States ship of war Maine aggregates about 2000 tons.

## GOOD HEALTH.

## Dandruff and Kerosene.

**EDITOR'S PRESS:**—While ago some one asked what to do for dandruff. As I have never seen any answer to the question (although there may have been one that I overlooked), I will state that clear kerosene oil is the best and cheapest thing I ever used. It not only cleans off the dandruff, but makes new hair grow nicely and prevents the old from coming out. I keep a bottle of it on my toilet table and once a week wet the top of my head well with it. The warmth of the head soon drives away the scent. Then put a little perfume on your hair and it will be in a beautiful condition for a week. Those who are not troubled much with dandruff need not use the oil oftener than once in two weeks. I usually put it on my head as soon as I rise in the morning. As I have used it myself and recommended it to others for 12 years, I know what I am talking about.

Another thing I feel convinced about in my own case, is that the use of the oil upon my head has cured me of a partial deafness, from a collection of dry wax in the ear. Do not mistake me and put it into the ear, for I do not think that would be safe; but by constantly applying it outwardly it has done the work.

MRS. J. HILTON.

**THE DANGER IN HOT BATHS.**—It is surprising that death by syncope during the use of hot baths are not more common. The peril of faintness by the mere determination of blood to the surface of the body, thus quickly depriving the heart of its usual normal supply and stimulus, is very great. In cases of muscular weakness of the heart this danger must be imminent whenever the "hot" or even the "warm" bath is used. Apart from this obvious risk, however, there is always the possibility that in weakly or too impressionable states of the nervous system, the peripheral stimulation produced by the application of heat to the whole of the cutaneous extremities of the afferent nerves may so act on the center as to arrest the evolution of energy by an inhibitory influence. It is doubtful if we lay stress enough on this condition when prescribing the use of such external agents as act on large areas of surface, and strongly impress the nerves there commencing. We know how burns of even moderate severity may kill by the impression they produce on the center of vitality from the periphery. There is much to learn in regard to the nature and extent of the central effects which may be thus caused. Whether for good or evil, the application of heat or cold to the cutaneous surface is a potent measure, and one that ought not to be recklessly resorted to, more especially in cases of great susceptibility, involving such excitability of the nervous center as often coexist with fairly good health in a weakly body.

**SAVE THE FINGERS.**—An extract from a surgical journal gives an account of the preservation of a boy's thumb, that had been severed from his hand, by the simple process of securing it to the stump and bandaging. The same paper declares that in many cases severed fingers are needlessly sacrificed.

## Life at High Pressure.

The most salient characteristic of life in the latter portion of the nineteenth century is its speed, and the question to be considered is, first, whether this rapid rate is a good one, and next, whether it is worth the price we pay for it? No doubt we "do" more, but in "doing" everything and "being" nothing? The first point to notice is that we have got into a habit of valuing speed as speed, with little reference to the use made of the time gained. Mr. Matthew Arnold tartly writes of the man who thinks it the highest pitch of civilization that trains run every quarter of an hour between Irlington and Camberwell. He thinks it nothing that the trains only carry him from a dismal, illiberal life at Camberwell to a dismal, illiberal life at Irlington. Baron Hubner describes how, in spite of frequent exhortations, the steamers across the Atlantic face all the dangers of icebergs met in fogs, instead of steering a more southern course and arriving but 48 hours later. The physical consequences of this needless hurry are grave enough; the moral consequences are possibly graver still, though both sets of efforts are as yet only in their infancy and will take a generation or two fully to develop.

The rapidity of railway traveling produces a chronic disturbance in the nervous system, and the anxiety to be in time, the hurrying pace, cause a daily wear and tear as well as accelerated action of the heart, which kills or injures thousands. The constitutions which are thus enfeebled and impaired we transmit damaged to our children, who add to and pass on the sad inheritance. Heart disease, too common already, may be expected to be more common still. We are, perhaps, most of us, conscious at some time of the need to be quiet and alone, but few of us have estimated adequately the degree in which an atmosphere of excitement, especially when we enter it young and continue in it habitually, is fatal to the higher and deeper life; the enfeebling poison which it disseminates throughout the whole character; how it snaps solidity and strength of mind; how it daily becomes more necessary and in increasing measure; how it enfeebles and renders abnormally sensitive the subtle organization of the brain; and how far, by slow and sure gradations, it carries us on toward a mental and moral condition which may justly be pronounced unsound.

But "high pressure" is shown even more in our own style of work than in our rate of movement. The world is more exacting in its demands from all laborers, except merely manual ones. Success in professional, public and commercial life demands more strenuous and exhausting toil, sterner concentration and a more harsh and rigid sacrifice of the amenities which time offers the easy-going than was formerly the case. The eminent lawyer, the physician in full practice, the minister and the aspiring politician, even the literary workman and eager man of science, are now condemned to an amount and severity of exertion which forces one after another to break off (or to break down) in mid-career, shattered, paralyzed, reduced to premature inaction or senility. What work does for the learned profession, anxiety does for the merchant and the manufacturer.

Men who have given up their entire being to business-labor often lose all capability of a better life, all relief for recreation or contemplation, all true appreciation of leisure when it comes at last, for the facilities of enjoyment, like all others, are apt to grow atrophied with disease. The successful man, too, often with much to retire upon, has nothing to retire to; for literature, science, domestic ties, public and philanthropic interests, nature itself have been lost sight of during the mad struggle, and these are treasures the key to which soon grows rusty. This ceaseless and severity of toil give the prizes of life to men of exceptional physique. Physical and cerebral toughness is the prime requisite. The moderately endowed in brains, in health and strength, are "nowhere;" the slow-moving hid fair to be elbowed out of their careers.

Less than a generation ago families could live with all the comforts and essential elegancies of life on a couple of thousand, who strive in vain to do so now. England, says a recent writer, is a paradise for the great proprietor, the successful merchant or engineer, the popular author, and sometimes for the skillful and energetic journalist; scarcely for the quiet, unassuming, unpushing, who would fain run a peaceful and contented course. It is easier to make much than to live upon a little, and the contented nature who desire to pass their lives neither in making money nor in spending it, who wish to use existence wisely and enjoy it worthily, are in danger of being crushed out of existence between the upper and nether millstone of the well-paid laborers and the lavish expenditure of the noble and ignoble opulent. There would seem to be small hope of attaining a standard of life truly dignified and worthy, except through such a regeneration in the tastes and sentiments of the opulent and noble, the leaders of fashion, the acknowledged chiefs of society, as should cause simplicity to become "good style," and luxury beyond a certain point, and ostentation at any point to be voted vulgar. The seeds of this moral revolution are already in existence. A few bright and resolute examples among the universally admired might make them germinate with a rapidity that would amaze us. — *Medical Classics.*

## A New Assay Furnace.

At the Consolidated California and Virginia mine on the Comstock, is a very complete assay office in charge of Prof. F. E. Fielding. To a Virginia Enterprise reporter, Prof. Fielding thus describes a new assay furnace in use there: "This," said the Professor, "is my New Regenerative Petroleum furnace for assaying, on which I have a caveat in the Patent Office at Washington. The power comes from two petroleum tanks—a regenerator tank containing 25 gallons, and a feed tank containing 34 gallons. I can make 1000 assays from one full charge of petroleum. Connected with the feed tank there is a large brass pressure pump, 14 inches in length and 7½ inches in diameter, which forces the petroleum through gas pipes and keeps the pressure on the oil even in the pipes at all times. It is regulated by a small gauge which registers 30 atmospheres and shows the amount of pressure.

"Experience has shown that the best pressure is regulated at the atmosphere of this level, which is from 12 to 15 atmospheres. The petroleum is forced through pipes and through equalizing valves to the furnaces, of which there are 12, there being six on each side, set on a table 9½ feet long, four feet wide and 20 inches high. At the furnaces the petroleum passes through nozzle burners made of phosphor bronze 12 inches long and 1 inch in diameter, and are covered with cast-iron slip tubes. They will last indefinitely. Passing through these nozzles, the petroleum is turned into highly heated hydro-carbon gas, and being mixed with air before it strikes the furnaces, it gives a perfect incandescent heat. Each of these furnaces holds three crucibles, giving us 36 assays every 15 minutes. I could now do all the assaying done on the Comstock in a very few hours daily. The furnaces are automatic, and should a crucible break and spill its contents, it cleanses itself in an instant by a simple outlet at the bottom. The residue is caught on the table, which is covered with two inches of concrete and fire-proof material. The furnaces are furnished with peep-holes, so that every stage of the operation can be seen. The only thing to be done in assaying is to raise the covers and take out the crucibles when ready, and put in new ones ready fixed for the operation, and turn valve on and off in equalizing the pressure of oil on each furnace."

## The New System's Advantages.

"I started these furnaces," continued Prof. Fielding, "on the 17th of this month. My first assay was perfect. I knew it would work but never dreamed of so complete a success. Its advantages over the old system of assaying are over 100 per cent. I could place an assay office like this in a parlor and never muss the floor or taint the ceiling with smoke. It is perfectly incandescent. It makes no more smoke than an electric lamp. All the material is consumed, and there is no smell. It doesn't cost near as much as the old furnace. There is neither masonry nor brick work to it. There is much saved in crucibles and covers. There is no coal used. I do as much work by this system in 2½ hours as I formerly did in five. It does not cost by 25 per cent as much for fuel. It is much healthier, as there is no incomplete combustion of coal to be breathed in the lungs by the workmen. There are no ashes, cinders, dust, smoke or sparks thrown off by it. The heat is intense, yet perfect in all its action. Yes, I made everything myself. There is not a thing connected with it that is not my work."

**ANOTHER DEBRIS SUIT.**—The county of Sacramento has begun suit against Weisler, Geo. Parker, Edward Mitchell et al., composing the North Star claim, who, it is charged, are engaged in the business of hydraulic mining on the American river and tributaries, asking that defendant be restrained from dumping debris into the water courses named. It is alleged that the stream have been filled up to such an extent as to cause overflows and great damage and compelling the resort to artificial means for confining the waters within bounds. It is further alleged that the property of the plaintiff, the Court House, Hall of Records, etc., is greatly endangered. A temporary injunction is asked for, pending the trial of the action.

**THE COAL MINERS' STRIKE.**—The leaders of the Knights of Labor and Miuree Union at the Newcastle coal mines have succeeded in arranging their difficulties regarding the strike, and made overtures to the Oregon Improvement Co. representative which were accepted, and the minees have commenced turning out coal again. This ends the strike that began with shooting and threats of bloodshed, and on account of which the Oregon Improvement Co. lost \$4000 a day during the time that the output of coal was stopped, or over \$30,000.

**AN ELECTRICAL COMPANY.**—Articles of incorporation have been filed in the office of the Secretary of State of the Electric Light and Motor Manufacturing Co. of Ohio. The purposes for which the corporation is formed are to carry on the business of manufacturing motors and electrical machinery, and to produce electric light. The principal place of business is Chico. The directors are James Anthony, Jesse Anthony, A. McFayden, Wm. H. Scholter and B. F. Clarke. The capital stock is \$100,000, divided into 4000 shares.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**PLYMOUTH.**—Cor. Amador Ledger, June 2: At this time Plymouth is dull, and there are several vacant houses in the town, a thing that has never happened before since the town started. The news as to when the Plymouth Consolidated will start to work again is vague and meager. Everybody has a theory of his own, and tells it, so that there are all kinds of rumors afloat. The latest that we have heard is that the mine will start up about the 1st of October next. The New London is still sinking, and it is generally reported that the mine abounds in rich ore. Anyway the perseverance that has been shown by the management of the mine makes everybody hope that it may prove a rich paying property. We hear that the War Eagle machinery works to a charm and that the cleanup was highly satisfactory to the owners. They still continue to take out good rock from the mine and think they have struck an extensive body of rock. The Glass Ball mine, just west of the War Eagle, is prospecting well, and Sol King and Wm. Bristow, the prospectors, think they have a good thing. H. P. Gordon is still pushing his tunnel and hopes to strike the lead before many days.

#### Calaveras.

**QUARTZ.**—Mountain Echo, June 1: The quartz mining outlook for Angels this summer, is very flattering. There will be some astonishing sales of mining property made in this section within the next three months, and changes will be wrought that will astonish the oldest inhabitants. Angels is certainly on the brink of the greatest mining boom it has known within the past 20 years, or more. All the necessary machinery for the construction of the hoisting works at the Whittle mine, situated about three miles southwest of Angels, has been delivered on the ground during the week. Operations will be commenced at once. The mine was bonded recently. The Utica mill will start up next Friday, after having been closed down about a month for repairs. Joseph Wilson has located 1500 feet of quartz vein in Angels mining district, near the Miller and Rooker mine.

**RICH ROCK.**—Calaveras Chronicle, June 2: From the Riverside mine in Hundred Ounce gulch, on the Mokelumne river, north of this place, some of the richest specimens of rock that one could wish to see have recently been found by Messrs. Holbrook and Blair, who have gone into the project of making explorations for a vein of quartz supposed to exist there. Hundred Ounce gulch was very rich in quartz gold in early times, and the reasonable inference is that there must exist a quartz ledge in the upper ground. The surface ground in that locality consists of red soil from three to six feet deep, full of quartz rocks and boulders of all sizes. Messrs. Holbrook and Blair have undertaken to uncover this surface by the hydraulic process, having constructed a ditch, laid down pipe, etc., to bring the water with which to operate. These specimens found are what is known as "float." The portion so far uncovered shows a broad quartz formation, but whether this will prove the vein from which all this "float" comes remains to be ascertained later. The indications, however, are most flattering, and the parties feel sanguine of uncovering a rich lead.

#### Nevada.

**THE EMPIRE.**—Tidings, June 2: From all we can learn, the old Empire is more than holding its own, notwithstanding the setback attending the recent disastrous explosion. One hundred and fifty men find employment here. Last week an air compressor auxiliary pump in the shaft was replaced by two "Cornish plungers," and new column pipe was put in. The old pump could not hold the water. Under the new arrangement a depth of 2000 feet can be obtained and all water handled. The shaft (incline, as are nine-tenths of the shafts in this district), is now down over 1700 feet, and the fact that sinking will be resumed next week, speaks loudly for the quality of ore found at this great depth.

**THE OUTLOOK BRIGHTENING.**—Nevada City Herald, June 1: The resumption of work at the Providence, the strike of good ore at the Nevada Sweet, the good prospects at the Merfield, and the starting of work at the Pittsburg, where a larger plant is being put in, begin to make things look very much brighter in this section. The good times have been delayed by local causes, but they must come. Other mines ought to, and will, start before long. If a sale is consummated with the Nevada City, or if it will pass into the hands that will work it, other mines in its vicinity will start up. The water there is too heavy for one mine to handle it all. The lessees of the Muller and Walling mine are about ready to start their hoisting works, and to commence sinking. There is a very good chance of getting a good mine there. The Nevada County mine is getting some very good milling ore, and is looking well. Altogether, the outlook is much more cheering.

**NEW ROCKY BAR.**—Grass Valley Union, June 1: John Treibner and party are working on the New Rocky Bar, and the result of their labors is about 50 tons of as fine-looking ore as can be seen anywhere. They are working with whim power, and are down about 125 feet from the surface. The ledge in the bottom of the shaft averages one foot in width, and out of the pile on the dump, scarcely a piece can be found but what shows free gold. This is the ledge pitching north and they are working on, and it is supposed to be the famous Ford and Mullin ledge that paid so handsomely a few years ago. The rock on the dumps is certainly rich, and plenty of the same kind is coming out every day. The mill, belonging to the company, will soon begin its work on this ore, and good results are confidently anticipated.

**RELIEF HILL.**—The Waukesha drift mine is owned by Williams, Jones & Co., and is worked by the owners. They have been running the tunnel ahead about 300 feet and have struck very promising gravel. They have let a contract for getting out timbers and are going to push ahead work quite extensively this season. The Union Co. is composed of Erasmus, Jepson Bros. & Co. They have run a prospect tunnel about 700 feet, from which point they made an upraise and have struck very good gravel.

The Blue Lead have again started up work. They have a tunnel over 1700 feet long, which was run through hard bedrock. They have made an upraise and struck gravel, and will take some of it out and work it. This lead is supposed to strike the Derby lead. If so the boys may be "on to" a very good thing. The Eureka Co. are working their drift claim at Relief Hill and it is paying well as usual. There is some assessment work going on around to hold claims, but things are generally pretty dull.

**OMAHA AND LONE JACK.**—Grass Valley Tidings, June 2: That Geo. Mainhart understands mines, no one can doubt who has a knowledge of what he has done at the Omaha and Lone Jack Consolidated during the past six months. The Omaha, 600 feet in depth and with drifts running from 400 to 500 feet, has been cleared of water and retimbered; new buildings have been erected and a water-power hoisting and pumping plant placed in position. This includes two Pelton wheels. On the Lone Jack a steam plant has been erected and the 500-foot shaft, with its many drifts, cleared of water and retimbered to the depth of 181 feet. When this shaft shall have been pumped dry it is the intention to connect it with the Omaha shaft and work the property through the latter. Twenty-five men, including contractors, are employed by the company. In the Omaha lower levels ore of good grade has been found and the stockholders and the superintendent are alike much encouraged. It is calculated to start up the Omaha 10-stamp mill—not a bad reduction works, by the way—early next month, when substantial returns are confidently expected from the ore now being extracted. Parenthetically, it may not be amiss to state that while the Lone Jack was operated \$500,000 was taken out.

#### Plumas.

**BUSHMAN & CO.'S MINE.**—National, June 2: The Bushman mine is located about 3½ miles from Quincy on Little Blackhawk ravine. A tunnel has been run 225 feet on the ledge and with excellent prospects. The company has just received a Huntington mill, rock-breaker and Challenge self-feeder. W. McPherson is putting up a 30-foot overshot wheel which will furnish plenty of power to run the machinery. The mill will be in operation in about four weeks. Plumas county has plenty of good paying ledges if they were developed. A little energy displayed in the right direction will make Plumas the leading quartz mining county in the State.

#### San Benito.

**THE ANTELOPE MINE.**—Hollister Free Lance, June 1: To G. W. Towle, of Emmett, we are indebted for some valuable information concerning the work that is being done in the development of the Antelope copper mine, and the ultimate prospect of the mine. The mine was discovered last December by G. W. Flemming, who, while quail hunting near the summit of the mountains, noticed some loose rock at his feet that apparently was of a mineral nature. He brought home a few specimens and had them tested for quicksilver. They proved to be rich in copper. Then he, in company with G. W. Towle, E. C. Towle, S. S. Ackley and one other, located the mine. At first a shaft was sunk where the float and out-croppings seemed to give the most favorable indications, but after going down a few feet the ledge on which they were, pitched off and compelled them to turn the shaft into the hill. Water then commenced to come in on them and they were forced to desert work at a depth of only 28 feet. But by this time they had struck what was apparently an inexhaustible supply of extremely rich copper ore, and samples were taken to San Francisco and submitted to experienced mining men, whose unanimous verdict was that the ore was of a superior quality. It was assayed and averaged 20 per cent to the ton in copper. The mine is owned in five shares. One-half share was sold last week for \$700. About \$2000 are necessary to complete a tunnel that is now being run into the hill about 60 feet, and which will strike the vein in about 100 feet more, also to erect suitable reduction works. Mr. Towle believes he has a good prospect for the development of a mine that will, in a few years, prove of vast benefit to this county, and which will give employment to many hands. One ton of the ore will yield 400 pounds of crude copper, which sells from 10 to 15 cents a pound. Two men can easily get out a ton of ore a day. Some little difficulty will be experienced in reducing the ore to crude copper on account of lack of water, the ore having to be hauled to the river, two miles distant. But this difficulty will be counted as nothing if the mine proves as rich as the present indications warrant one to believe. Mr. Towle will proceed at once with the tunnel, which can be run at the rate of two feet a day. The vein of ore ought to be tapped again easily in a month's work, and when this is accomplished a body of copper ore will be laid open which will be superior to any other copper mine on the Pacific Coast.

#### Sierra.

**THE BUFFALO MINE.**—Sierra Tribune, June 1: At the Buffalo mine the tunnel is in 350 feet. We are informed that the ledge through this tunnel will average something like 14 feet in width. The face of the tunnel is about 150 feet below surface. Yesterday No. 2 adit was started on a level with the bed of the creek and 80 feet below the upper tunnel. The owners expect to erect a 10-stamp mill there this season. Our mountains are filling with prospectors, and new discoveries of fine auriferous ore is being unearthed almost daily. Sierra county promises to eclipse any of the big mining camps on the Pacific slope.

#### Shasta.

**THE CENTRAL MINE.**—Redding Free Press, June 2: Owing to some new machinery which it is intended to put in, and the fact that a large bulk of the ore now received is not of sufficient high grade to ship, it is thought best to shut down the mine for the present. The necessary chlorination machinery, which is an English patent, will occupy most of the summer months. Probably a tunnel will be run soon on a 200-foot lower level, and it is expected to resume operations about October 1st. Major Whitehouse left for the East this week on his way to England. Mr. A. A. Anthony is in charge of the property at the mine.

#### Trinity.

**LOWER TRINITY TUNNEL.**—Trinity Journal, June 2: Work is being resumed on the Lower Trinity tunnel. Mr. McCus is getting things in readiness there so that as soon as Mr. John Bamber, the contractor, who is expected daily, arrives, work can at once be resumed. Mr. Bamber will complete

the tunnel as soon as possible. The company through their agents, Messrs. Fowler and McWorthy, have purchased the Taylor Flat mining property from J. A. Tinsley for \$8000 and will work that property in connection with the tunnel. Mr. McWorthy left for Oakland Sunday, but will return in about two weeks and superintend the construction of a dam across the river. When the tunnel is completed the river will be turned through it and the bed will be worked by elevators, for which purpose the Taylor Flat water will afford ample power. Another season's work will see the tunnel in operation and the owners can look for a return on their investments. Next winter the company will open Taylor Flat in a proper manner, at the lower end, and work the claim systematically. These operations will be of great benefit to that section of the county.

**A GOOD CLEANUP.**—The Enterprise mine of the East Fork mining district still holds its own as a first-class producer of bullion. Mr. Wm. Leavitt brought into town this week \$3700 as the cleanup from 27 tons of ore from the mine. The gold run into a brick made a very pretty sight for tired eyes to look upon. East Fork has a very promising future, and the erection of a few mills will give it a permanent boom.

#### Tuolumne.

**LOOKING WELL.**—Union Democrat, June 2: The Laura mine near Cherokee, superintended by Mr. S. J. Corbett, is looking well, and the lead averages three feet in width. Work on the new ditch of the Eureka Consolidated Co. is being pushed with all possible dispatch. The business troubles of the Black Oak Mining Co. have been arranged. It is reported that the Patterson mine has developed a rich chute in the south exploration works at a depth of over 500 feet. John Garaventa is about forming a local syndicate to work his mine beyond Sonora—that is, in case the parties who have been negotiating for its purchase in London do not consummate matters at an early date. John Hartwig had one ton of quartz crushed at Mr. Ferguson's mill lately and it yielded 13 ounces of gold. He has a shaft on the mine and it is now down about 70 feet. Mr. Frank J. Gross of Tuttletown informs us that the mill on the mine recently bonded by him to San Francisco parties is about ready to run. The mill has 15 stamps, but as the parties are in a hurry to start operations, it will begin crushing quartz next Monday with one battery of five stamps. The other stamps will be placed in position at leisure. This lode runs northerly and southerly, averages 2½ feet in width and prospects well. A shaft 35 or 40 feet in depth was sunk on this mine some years ago and about \$10,000 was taken from it.

### NEVADA.

#### Washoe District.

**YELLOW JACKET.**—Virginia Enterprise, June 2: Are shipping 100 tons of gold-bearing ore to the Santiago mill daily.

**KEYS.**—Are hoisting ore from the winze on the 240 level.

**ANDES.**—Still drifting on the 240 and 350 levels in a favorable formation.

**WEST CON. CAL. AND VA.**—Are putting up a hoisting plant and sinking the shaft.

**BULLION.**—On the 640 level the two crosscuts, east and west, are making good progress in a favorable formation.

**SCORPION.**—The south drift on the 300 level has been extended 20 feet during the week, making its total length 295 feet.

**UTAH.**—On the 372 level the south drift has been extended 57 feet; total, 280 feet. The formation is clay, porphyry and quartz.

**BALTIMORE.**—Are still pumping water, but will soon have the mine drained, when work will be resumed on the 280 level north and northwest drifts.

**CONFIOENCE.**—Are shipping to the Brunswick mill for reduction 192 tons of ore daily, the average battery assay of which shows a value of \$32.64 per ton.

**ALTA.**—Machinery at the mine and mill running smoothly. Are hoisting about 30 tons of ore daily from the 825 and 1150 levels, and reducing the same at the mill.

**IOWA.**—The east drift from the south drift, McBe tunnel, has been advanced 20 feet. Have cut through some fine-looking quartz. Are still in vein matter, showing fair assays.

**BEST AND BELCHER.**—On the El Dorado tunnel level the northwest drift from the main west drift has been extended 55 feet; total, 157. The formation is quartz, showing value by assay.

**CHOLLAR AND POTOSI.**—The mines are yielding the usual amount of ore. Prospecting work is actively prosecuted. Have commenced laying pipes for the new system of water-power.

**BELCHER.**—Have stopped the south drift from the 500 upraise, and started a west crosscut 90 feet south of the north line. It is now in 21 feet. The 1300 raise advanced 31 feet on the slope (west) during the week.

**LAOY WASHINGTON.**—Are raising from the 725 level, and are now up a distance of 320 feet in clay adjoining the veins. Are crosscutting from this raise at a height of 110 and 210 feet above the 725 level.

**HALE AND NORCROSS.**—During the week have hoisted 1575 tons of ore from the 600 and 700 levels, and have shipped 1000 tons to the Mexican mill—average battery assays of same, \$37 per ton. Have bullion on hand and previously shipped amounting to about \$90,000.

**CHALLENGE.**—The joint Challenge-Yellow Jacket raise on the 1000 level is up 44 feet, 19 feet having been added during the week. The Challenge raise on the same level is up 110 feet, having advanced 22 feet during the week. The last 10 feet run was through good ore.

**ALPHA AND EXCHEQUER.**—The west drift on the 122 level is in a mixture of clay and porphyry, while the south drift continues in quartz and porphyry. The northeast crosscut on the 222 level is in clay. The north lateral drift on the 382 level is in a mixture of quartz and clay, and the winze, now down over 120 feet, is still in clay.

**CROWN POINT.**—The south drift from the 600 level, from the east crosscut, advanced 30 feet in

low-grade quartz. Have stopped it and are pushing the east crosscut, which has been extended 31 feet during the week. It passed through six feet of quartz which assayed well, and the face is now in porphyry and clay, with some water running from it.

**SAVAGE.**—Work progressed as usual on the several levels during the week, and the ore resources are looking well. Are extracting about 100 tons of ore daily from between the 400 and 900 levels, and are shipping about 80 tons daily to the Rock Point mill—battery samples of same average \$35 per ton. Have bullion on hand and previously shipped for the month amounting to \$28,000.

**OCCIDENTAL.**—In the upper tunnel, at the top of No. 1 upraise, south of the north incline winze, the south drift has been extended 14 feet; total, 137 feet. No. 2 upraise, north of the north incline winze, has been carried up 9 feet; total, 113 feet. At this point the south drift has been advanced 3 feet. Forty-five feet below the upper tunnel, in the boiler winze, the north drift has been advanced a total of 20 feet.

**GOULO AND CURRY.**—On the El Dorado tunnel level the southwest drift has been extended 35 feet; total, 236. This drift has been connected with the upraise from the drain tunnel. The drain tunnel northwest drift has been extended 73 feet. The formation is quartz and porphyry. During the week there has been extracted from the 250 and 300 levels 180 tons of ore, and shipped 27 tons to the Douglas mill. The Douglas mill has worked 1000 tons and 1600 pounds of ore, yielding a bullion value of \$16,608.18. This bullion has all been shipped to the home office in S. F.

#### Bristol District.

**TESTS.**—Pioche Record, June 2: The experimental run now in progress at the Bristol mill, made to determine whether or not the ore there can be profitably treated by the leaching process, proves that method of treatment to be superior to any other for the working of the ore there. The White & Howell roaster was fired up last Thursday, and on Friday the new set of Wall rolls were put to work crushing ore. So far, about 150 tons have been crushed, roasted and chloridized. The ore is run through a 10-mesh screen, and chloridized to 90 per cent without trouble, and leached up to 85 per cent, the filtration being perfect. Ore will be crushed for a few days longer, when the product will be leached, which will take some time, as the vats and tanks are not in order yet. These tests are being made under the management of Mr. Anthony H. Godbe, and are so satisfactory that there is but little doubt but that the leaching method will be adopted in working all the ore there. The average value per ton of the ore now at the mill is much lower than was at first stated, and the bulk of it will need resorting. How soon active work will be resumed at the Mayflower mine is not known, as the company at Minneapolis, Minn., has not intimated what will be done.

**COPPER SMELTER.**—Chas. L. Roe is erecting a copper smelter at the north end of the mill at Bristol. It will be of about 10 tons per day capacity and the blower will be run by steam from the mill. Roe has about 60 tons of good copper ore lying on the dump at the Ohio mine at Bristol district, which was mined years ago. The present price of copper justifies him in erecting the furnace and developing the mine, in which a good seam of copper ore is exposed, but which has remained untouched for years past on account of the low price of the metal and the expense of transporting the ore to market.

#### Eureka District.

**SPEISS AND MATTES.**—Sentinel, June 2: The new arrangements at the Eureka Con. furnaces for economically handling the speiss, mattes and slag are completed. The engine has been set up on the north end of the dump, and a substantial incline track laid to connect with a wide trench at the side of it. From the trench three tunnels have been started to run out under the dump, which will be loosened up from time to time by exploding big charges of powder in it. The slag, speiss and mattes will be dropped into cars, and then run out to the trench, hoisted to the top of the dump and the slag deposited at the north end. The speiss and mattes will be conveyed to a bin situated underneath the furnaces, over a tramway that was built for that purpose, and there be loaded into a skip and hoisted to the feeding rooms. Thus the whole mass of material will be handled in the cheapest possible manner. From 40,000 to 50,000 tons of speiss and mattes will remain to be treated, which will take over two years to resmelt at the rate it is now, and will be a source of considerable revenue to the company. Al. Titus has the direction of the work under Superintendent Donnelly, and on account of his many years experience in the employ of the Richmond Co., is a first-class man in the place.

#### Morey District.

**SILVER.**—Belmont Courier, June 2: At Morey John A. Moore and E. Schendell, who are engaged in mining, have uncovered one of the biggest bodies of silver ore ever found in the district—it is equal to that discovered by Hammond & Austin some years ago—the assays run from \$300 to \$500 per ton; 12 miners are engaged stopping the ore. The Fletcher Bros. have struck a fine body of ore in their mine; John Williams is hauling ore from Morey to Eureka; Morey will be a lively camp this summer.

#### Patterson District.

**READY.**—Pioche Record, June 2: The quartz mill at Patterson district which was recently removed from Silver Park district is about ready for work. Ed L. Robertson, the manager, has offered such favorable rates on ore that D. C. McCarter of Silver King district, will dispose of his ore to him instead of shipping it via this place to Salt Lake City, as intended a few weeks ago.

#### Spanish Belt District.

**LOOKING WELL.**—Belmont Courier, June 2: J. E. Severance reports that the Barcelona mine of Spanish Belt continues to look well. The ore extracted from the south end is of a high grade, and the pay streak increases in width as the work advances. The north end of the mine is looking fine, and there is considerable milling and concentrating ore in sight. The force of miners is being increased as rapidly as possible. Mr. Severance has put a concentrator below the one which is successfully concentrating the low-grade ores of the Barcelona for the purpose of concentrating the tailings. There are several dollars in these tailings which can thus be saved without incurring any additional expense. The



mill is running nicely and enough ore is being hauled from the mine to keep the concentrators running steadily. It is the intention of Mr. Severance to send for several more concentrators which will be set up near the mine at Spanish Belt, and thus save the expense of hauling. The high-grade ore will be sent to Salt Lake for treatment, and the second-class ore will be reduced in the Monitor-Belmont mill. Spanish Belt is in fair way of becoming a permanent mining camp.

#### Tuscarora District.

NAVAJO QUEEN.—*Times-Review*, June 2: An increased flow of water has retarded progress considerably this week. It has now slackened off. Have commenced drifting southwest on the ledge, which shows a fair grade of ore in the face.

NAVAJO.—Winze on east vein, 250-foot level, sunk 9 feet; total depth, 38 feet. Developing some good ore.

NEVADA QUEEN.—Upraise in the east vein has been carried up 27 feet, connecting with the winze from the 200-foot level, supplying good air in this part of the mine. In putting in timbers over the level, the ore taken down is high grade; car samples, \$274.

NORTH COMMONWEALTH.—During the week, 35 feet of prospect shaft No. 3 was timbered. At 30 feet the shaft encountered a large vein showing considerable mineral. The last 3 feet is a good grade of free-milling ore. The bottom of the shaft is still in ore.

GRAND PRIZE.—On the 200-foot level the west drift has been advanced 14 feet; the face showing a 20-inch vein of high-grade ore. During the week a north crosscut has been started from this drift and is in 11 feet in a favorable formation. East drift advanced 13 feet; the ore continues right along and is getting larger as it is opened up.

NORTH BELLE ISLE.—No. 1 winze, 300-foot level has been started north of No. 3 crosscut and sunk 10 feet. The vein in the bottom shows a good width of high-grade ore. The regular amount of ore has been extracted from the different levels and sent to the mill and dumps. Material for the concentrating plant will begin to arrive to-morrow.

COMMONWEALTH.—100-foot level: An east crosscut has been started near the face of south drift and driven 21 feet; the face is all in vein matter, giving low assays. The drift from upraise north of the shaft, 150-foot level, has been extended 8 feet, showing 14 inches of good ore; average assay, \$280 per ton. This drift will reach upraise from east crosscut, 150-foot level in a day or two. 150-foot level: South drift from the station has been advanced 15 feet, exposing fine ore the entire distance. East drift following the ore found 61 feet south of the shaft, has been advanced 14 feet, and is showing more rich ore than at any time heretofore; car samples from these two drifts average \$260 per ton.

#### Tybo District.

NYE.—Belmont *Courier*, June 2: At Tybo the Nye Mining Co.'s mill is running 20 stamps on ore from the 26 mine, and 30 tons of it are run through every 24 hours; 16 men do all the work in the mill—8 on each 12-hour shift; the Dinwick mine is producing its usual quantity of good ore which is shipped to Eureka for reduction; the Gilmore Bros. mine is producing some fine ore which is sent to the Nye Mining Co.'s mill for reduction; L. B. Fairbank continues to prospect his mine.

#### ALASKA.

BLACK SAND.—Juneau *Record*, June 2: The latest mining craze in the territory is the black sand deposits in the Yakutat country. Everyone who has money enough and no business affairs to hold them back, are pushing on toward this section. The little schooner Charlie, Capt. J. J. Healy, with a large number of passengers, had a perilous trip, but at last reached Yakutat in safety. The steam schooner Leo has also sailed for the black sand regions, carrying 39 passengers and a large quantity of freight consisting of lumber and supplies. The Charlie has returned, and the reports brought back from the Yakutat country by Capt. Healy are not the most favorable. An undue excitement was created among many of Juneau's citizens by irresponsible and fictitiously glowing accounts published of the deposits in that section. It has even been published that the black sand brought from there assayed between \$40 and \$60 to the ton, which of itself was an outrage, and only intended to excite those who knew little or nothing concerning black sand. It is claimed that sand which will assay from \$1.50 to \$3 will pay handsomely to work. However, there is still reason to believe that Yakutat is in a gold-bearing section, and with the number of experienced prospectors there at present, we have every reason to hope that rich diggings will be discovered this summer.

MILL.—The work of clearing ground for the foundation for the new 120-stamp mill on the Treadwell claim is progressing rapidly. Quite a number of placer locations have been made lately on Gold creek, near its confluence with Gastineau channel, just outside of the town limits. The Huntington quartz-mill, erected last summer by Price & Johnston, at Berner's bay, is reported to have been carried away recently, or covered up by a snowslide. Clark Miller and Charles Crockett, two gentlemen from Southern Oregon, who have had considerable experience in black sand mining, left for the Yakutat country on the Leo. These gentlemen have a new process for separating the sand and gold, and propose giving it a thorough and practical test.

#### ARIZONA.

CHLORIDE NOTES.—Cor. Mohave *Miner*, June 2: Once since the days of the 60's has the mining outlook jumped into prominence hereabouts, and that is now. At the Connor mine Messrs. Kelly & McKinnon are taking out a ton of rich ore per shift while drifting to the old works, and as soon as connection is made and stoping commences you may depend on regular shipments of rich ore, as for 20 feet in the drift they have from 27 to 42 inches of rich ore, which has never before been equaled in the Connor mine. Messrs. Heimrod, McDuffie, Uncapher, Meehan and Brandon have taken a lease on the Connor mine south from the steam hoist, and will commence operations as soon as they can move over. Ed. F. Thompson has purchased the interest of Dan McGlone in the lease of the Lone Star, and as that mine is producing ore sufficient to keep ex-

penses down, he has the hopeful expectancy of all miners.

#### COLORADO.

SILVERTON NOTES.—*Miner*, June 1: The ore shipments average 60 tons daily. In 30 days from now they will be 150 tons. A. H. Bridgman and W. W. Reese have secured the lease on the Bear mine, and operations will begin early next week. The Green Mt. concentrator will soon start up on the second-class ore, of which there is an endless quantity in the Green Mt. mine. The Veta Madre Co. will erect their new concentrator at the terminus of their tramway, which will be almost on the town site of Howardsville. Dr. J. N. Pascoe has received notice from Messrs. Bauman and Ehrhardt that they will resume work and pay up the indebtedness on the Prodigal Son in the near future. Sam Hecr is hiring men to work on the Cleveland, a well-known property three miles below town. The ore in this mine is worth \$800 per ton. Jerry Fisher expects his stamp-mill and concentrator to arrive before the 10th of June. The site has been excavated, and lumber is being placed on the ground for the buildings. It will be in operation by July 15th. The transfer of the Middleton concentrator took place to-day at Howardsville, the Veta Madre Co. being the purchasers. A large force of men are being employed and the mill will be put in shape for operation with the utmost speed. Mr. Geo. H. Inge is making preparations to work the Jayhawker in Ice Lake basin very extensively this season. The mine already has over 900 feet of development and a large body of ore has been opened. Millruns last year returned a value of 2½ ounces gold and 30 ounces silver per ton. The North Star on Silt in struck a solid foot of gray copper with the long crosscut tunnel. Drifting both ways is now going on, and the ore streak improves with every foot. Five tons per day is delivered at Stojbers' sampler at present, but the force will soon be increased and the output largely augmented. The strike in the Tower Mt. Co.'s mines still holds good, and it seems to be a permanent chute. An upraise has been made 40 feet in the mineral and the ore shows no diminution either in grade or quantity. A lot of the ore, several tons, has been sent to town for a test, and regular shipments will begin as soon as arrangements can be made for packing.

LOWER CARBONATE HILL.—*Denver Tribune-Republican*, June 2: James Campbell, manager of the Wyoming Mining and Prospecting Co., operating at Leadville, is in the city. Mr. Campbell is engaged in sinking the Pocahontas shaft, situated on the northwest slope of Carbonate hill, and just below the Glen-Pendery fault. The shaft is now down 350 feet, and Mr. Campbell yesterday received a telegram from Nels Larsen, his superintendent, stating that contact had been encountered and that the outlook for mineral was very good. As Mr. Larsen sank the St. Mary, Big Chief and many other producing shafts in the Carbonate camp, his judgment may be accepted as good, and the probabilities are that ore will be found on further exploration. The shaft is quite wet, making perhaps 500 gallons of water per minute, but there are now three pumps employed, connected with a 10-inch discharge pipe and no difficulty is anticipated in handling the water. An additional 80-horse power boiler has just been ordered to reinforce the plant. The shaft is on the line of the great Morning Star and Maid of Erin ore chutes, and there is a possibility of the Pocahontas becoming the McKeon of Carbonate hill.

EAST FRYER HILL.—Among the pioneer mining men of Leadville is the city at present is L. D. Roubush, a large owner in the Robert E. Lee mine. He reports the Lee looking very well and yielding some very good ore, which is being mined through the north shaft on the Matchless mine. The El Paso shaft, in which Mr. Roubush is also largely interested, has attained a depth of about 485 feet and the outlook is most encouraging. Sinking continues steadily, and there is little question that only a short time can elapse before the ore zone, and in all probability good mineral will be encountered. The El Paso, together with other claims, belongs to the Ward Consolidated group, and is being developed by Messrs. D. H. Moffit, Eben Smith, L. D. Roubush and others. The Forepaugh mine is shipping about 100 tons of ore a week. The mine looks very encouraging and gives evidence of re-entering the list of bonanza mines at an early day. The other properties in this portion of the Leadville district show no material changes.

#### IDAHO.

THE WAR DANCE MINE.—*Wood River Times*, June 1: A chunk of ore from the War Dance mine, on Deer creek, was shown on Main street, to-day, which is as pretty a specimen as was ever seen here. It is just as it came from the vein, yet is as square and smooth as a glass paper weight. It is about two inches thick and four inches square, a ribbon of gray copper ore to three inches wide running transversely through it, and weighs about eight pounds. It will probably assay 3000 ounces silver and 75 to 80 per cent lead per ton. There are 26 men employed at the War Dance group, and much ore is being extracted. The most of this is left on the dumps, awaiting the building of the concentrating works, which Mr. Burns will go to Denver, next week, to hurry, as he wants to get them running at the earliest possible date. They will run by water-power. At present only about a carload is shipped per week, the owners aiming to keep the income just abreast of the outlay. The ore-chute or chimney is 1000 feet in length and eight feet in width in places. From present appearances the War Dance will give steady employment to 100 men before the summer is over.

ROSEBUD GULCH.—*Wardner News*, June 1: Hardly a day passes that we do not hear of most encouraging reports from Rosebud gulch and the country adjacent. The great extent of the mineral belt in that region is a marvel to all miners, and it is no wonder that men owning locations thereon should feel encouraged. Horton & Alger were driven out by water last week in their lower workings on the Nellie claim where they were sinking a shaft, and as other workings were also wet they concluded to prospect further up the mountain. At a distance of 800 feet, on the same lode, they have uncovered 50 feet of rich ore averaging 12 inches in width which will run from 1000 to 3000 ounces silver, dry ore. There is a large quantity of this ore profuse in

native silver, and this last find averages a better grade than any heretofore found, and is a much stronger chute. It seems strange that every day we are found leaving Coeur d'Alene for other points and far distant regions to prospect for mines when there is plenty of vacant ground, within half a mile of our railroad, showing good mineral on the surface. Opportunities are plenty where men, who are willing to work, can get rich and abundant returns for their labor if they will only take the pains to look the country over.

ORO FINO.—*Idaho Avalanche*, June 2: We are pleased to note that more men are being put to work on the Oro Fino lode, and that bids are being received for the cutting and delivery of 1000 cords of wood at the mine. This seems to indicate that work will be prosecuted vigorously on the Oro Fino group of mines. The drift being run on the Sinker is now in about 300 feet, with a good-sized lode and fair-milling ore. From appearances the mines belonging to the Oro Fino group are going to produce a whole lot of ore the coming season.

#### NEW MEXICO.

DEVELOPMENT WORK.—*Silver City Enterprise*, June 1: Fred Rogers came in from Gold Hill this week on court business. He has been running his arrastra for some days, but has not yet made a cleanup. Que Red, a well-known sport, has gone to mining at Central, and is said to have a splendid gold prospect, many of the specimens taken from his mine contain wire gold. Que is working like a Turk. L. D. Fisher is doing considerable work of late on his mines at Central, and has an abundance of good ore in sight. The Mogollon Mining Co. has been organized in St. Louis. The men reported to be in this move are said to have gradually gathered in the bonds of the Sheridan mill at Socorro last week. It is understood that Peacock men are in the move and will run the Sheridan on ore of that mine and for custom work. Dr. Franklin Mahon, who has been in charge of the Santa Rita mines during the past five years, was in town yesterday. He states positively that the mines have not been sold, but are still owned by the Boston Co., newspaper reports to the contrary notwithstanding. The mines will be cleared of water and debris preparatory to beginning work.

COONEY CAMP.—The Cooney mill on Silver creek shut down Saturday for the purpose of putting in pans and settlers, it being demonstrated that plate amalgamation did not save the chlorides. The pans have been hauled in and are being put in place as rapidly as possible. Probably in ten days the mill will start on assorted rich ore which is being packed from the Maud S. Previous to shutting down he had made several tests on ores and concentrations in a small cleanup pan under the supervision of J. A. Davis, the results being 90 per cent saved by pan amalgamation in the concentrates collected during the run made by plates, and 98 per cent in the ore samples from the mines. The mines are developing into large ore bodies, the Maud S having a solid breast of high-grade ore eight feet wide. There is upon this mine alone enough ore in sight to keep the Cooney, Peacock and Sheridan mills running for five years.

#### OREGON.

GRAVEL AND QUARTZ.—*Jacksonville Times*, June 1: The Sterling Mining Co. has a good supply of water again and is moving heaps of gravel. W. G. Kenney has purchased a fourth interest in Klippel & Keten's ledge in Willow Springs precinct. The late rains have increased the water supply somewhat, which will enable many of the miners to clean up the last season's work. Granville Sars & Co., who have an excellent quartz ledge in Willow Springs precinct, are running a tunnel to tip it lower down. The ore prospects well. Klippel & Co. have several men engaged in taking out and assorting quartz. Their ledge has increased in size and the ore looks very well. They crushed some of the richest in hand-mortars during a portion of two days this week and got \$320. A Hatch sent 15 ounces of ore from his ledge on Jackson creek to J. H. Fisk of Portland, assayer, and received a very favorable report, the assay showing about a dollar per ounce in gold and silver. The quartz is principally silver-bearing and very rich. E. Sanderson Smith has a large force of men at work on the Gold Hill Mining Co.'s mill, which was started up yesterday. It has a capacity of 15 tons a day and is expected to do good work. A large amount of excellent ore is already on the dump and much more in sight. It is to be hoped that this enterprise will prove remunerative, as the projectors deserve the fullest measure of success.

SPARTA.—*Badrock Democrat*, May 26: Dr. Jay Guy Lewis, Supt. of the Del Monte group of mines at Sparta, has been in the city for a couple of days. The Dr. brought over some fine samples of ore taken from his mines which the *Democrat* man had the pleasure of inspecting. These ores are high grade, are very rich in gold and silver, and are of a character easily worked. Dr. Lewis is highly pleased with the favorable outlook of the Del Monte, and intends to continue development work throughout the summer. Sparta will again be one of the liveliest mining camps in the great Inland Empire.

#### UTAH.

BULLION SHIPMENTS.—*Salt Lake Tribune*, June 1: The receipts in this city for the week ending May 30th, inclusive (the day named being a holiday, thus reducing the days to five for labor), were to the value of \$121,389.63, of which \$61,949.56 was bullion and \$59,440.07 was ore. For the previous week the receipts were \$45,327.93 in ore and \$71,024.71 in bullion, a total of \$116,352.64. The Ontario output for the week was of bullion, 24,470 fine ounces; ore sales, \$27,779.07; an approximate total of \$52,249.07. The daily product for the week was 9 bars of bullion, 12,298.85 fine ounces. The Horn Silver continues much, and it is probably doing something in a small way; whether enough to pay expenses and avoid an assessment on the stock is not known. Fine bar receipts for the week were to the value of \$36,767.85. The Hanauer smelter produced for the week \$15,625 in bullion; the Germania \$9556.71 in bullion. Ore receipts in this city for the week were to the value of \$27,779.07 by Wells, Fargo & Co.; \$26,150 by McCormick & Co., and \$5511 by T. R. Jones & Co.

### List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in DEWEY & Co.'s Patent Office Library, 270 Market St., S. F.

FOR WEEK ENDING MAY 29, 1888.

- 383,694.—HORSESHOE—J. E. and E. W. Bing-ham, Walla Walla, W. T.
- 383,700.—ANIMAL TRAP—J. Brusie, Oakland, Cal.
- 383,629.—TRANSPLANTING TOOL—T. R. Coon, Hood River, Ogn.
- 383,572.—HEATER FOR TEA, ETC.—C. W. Hell-eland, Salem, Ogn.
- 383,577.—MECHANICAL MOVEMENT—M. B. Kellogg, S. F.
- 383,531.—PRESERVING PILES—Chas. C. Lane, S. F.
- 383,736.—PRESERVING PILES—Chas. C. Lane, S. F.
- 383,818.—MAP AND CHART SUPPORT—W. H. Larew, Mariposa, Cal.
- 383,739.—FRUIT-STONING MACHINE—B. A. Lil-lie, S. F.
- 383,826.—AIR SUPPLY FOR PROPELLING CARS—L. C. Pressley, S. F.
- 383,510.—SCREEN—D. Wesemann, Los Angeles, Cal.
- 15,556.—TRADEMARK—F. M. Towne, San Ber-nardino, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

### Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

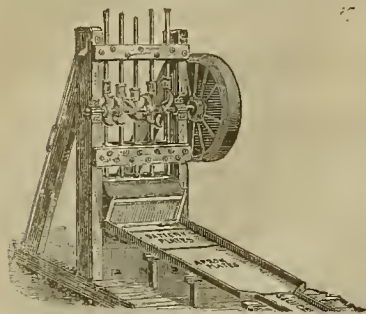
ADJUSTABLE MAP AND CHART SUPPORT.—Wm. H. Larew, Mariposa, assignor of one-half to W. C. Reid. No. 383,818. Dated May 29, 1888. This appliance for schools consists of an adjustable frame and board serving as a map and chart support. It has its principal use in schools where children are to be instructed from blackboards, maps or charts, which, being of suitable size, would leave the work at varying distances from the eyes if they were suspended at a fixed point. By the use of this adjustable supporting device the different positions of the map or chart may be successively brought into the proper position for more easy and convenient inspection.

FRUIT-STONING MACHINE.—Benjamin A. Lillie, S. F. No. 383,739. Dated May 29, 1888. This is one of those machines in which are employed rotating cutters mounted in adjustable frames in such a way that when they seize the fruit between their cutting edges and carry it down between them, they may conform themselves to the size and shape of the pit against which they operate, and to which are also employed in connection with the cutters, knives or scrapers below for clearing the flesh of the fruit from the pit. This is an improvement on a former patent by the same inventor. It consists in certain improvements, consisting of novel adjustables opposing guides on each side of the rotating cutters, and adjustable knives in connection with the ordinary knives or scrapers.

ANIMAL TRAP.—James Brusie, Oakland, No. 383,700. Dated May 29, 1887. This is specially intended for a rabbit-trap. A cage of wire netting is made, and to prevent rabbits turning the ground within this inclosure, is covered with wire netting. All around the base of the cage are openings with doors. These doors are of transparent material, such as glass, and are hinged above so as to swing. Any suitable enticing material or food is placed within the cage. The rabbit sees what he deems an unguarded opening, the door being of glass, and therefore not noticed by him, he makes for the opening, and the door swinging inwardly, admits him, and under his original impulse he passes through into the cage. He cannot get out again for the doors do not swing outwardly. In order to insure the entrance of the rabbit, Mr. Brusie places within the cage, and just behind each door, a mirror, the location being such that upon discovering and approaching the supposed opening of the door, the rabbit cannot fail to see his image in the mirror. Surprised by this, he picks up his ears, and, his image doing likewise, he is the more impelled to enter the cage or inclosure; "in order," says the inventor, "to make the acquaintance of so close a companion, for though other rabbits might really be within sight, still the proximity and sympathetic actions of the reflected rabbit do more to create a sudden impulse toward the door than the confined real rabbits do." This trap can be easily carried from place to place. The wire netting can be rolled up as when first bought, into small compass, and the four posts, mirrors and doors are easily packed.

THE MINT CLEANUP.—Mr. Hirschberg, acting superintendent of the Mint, announces that the yearly cleanup will take place in June. The Mint will close on June 16th for the receipt of crude deposits, and on the 23d for fine deposits, and will not reopen again until July 9th.



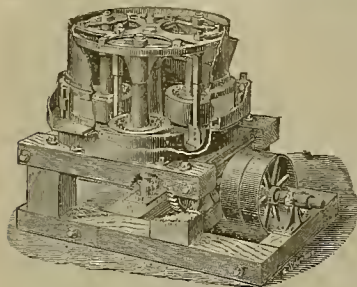


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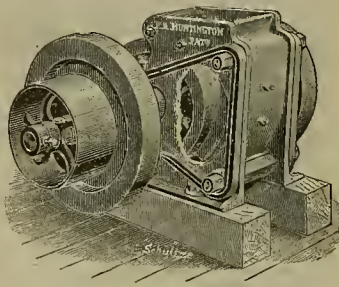
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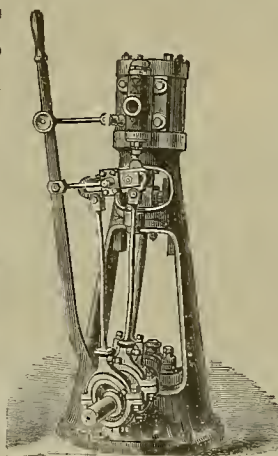
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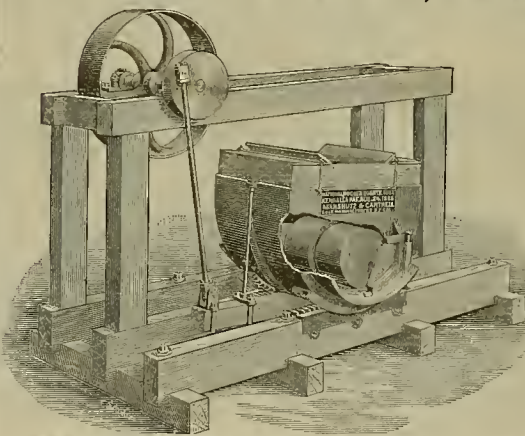
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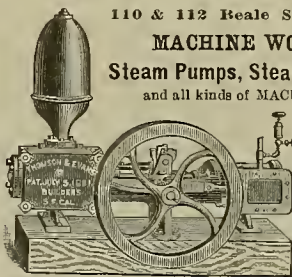
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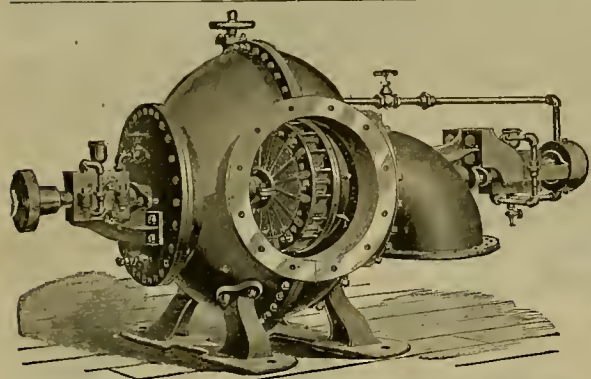
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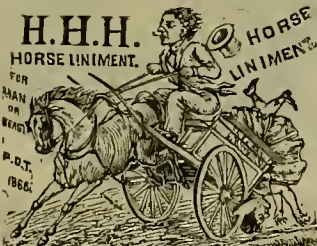
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**FOR RAILROADS AND LAND CLEARING.** Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

**BANDMANN, NIELSEN & CO..**

CAPS and FUSE for Sale

GENERAL AGENTS, SAN FRANCISCO CAL.

**THOMAS PRICE'S ASSAY OFFICE,****CHEMICAL LABORATORY,****BULLION ROOMS and ORE FLOORS,**

524 Sacramento Street, San Francisco, Cal.

**COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.****WORKING TESTS OF ORES BY ALL PROCESSES.****SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.**

**Ores Received on Consignment, Sampled, Assayed, and Disposed of in the Open Market to the Highest Bidder.**



## Mining Share Market.

The depression in mining shares still continues, notwithstanding the vigorous work now going on at the Comstock and other mines dealt in at the Boards. The following mining companies report cash on hand June 1st:

Consolidated California and Virginia, \$106,160 in cash and \$189,338 in unsold bullion; Confidence, \$154,265; Overman, \$29,618; California, \$1155; Bulwer Consolidated, \$382; Gould and Curry, \$13,749; Crown Point, \$24,516, with \$2602 to be collected on the pending assessment; Hale and Norcross, \$96,675; Ophir, \$4589; Andes, \$17,016; Sierra Nevada, \$23,340; Mono, \$20,975; Bodie Consolidated, \$31,674; Tioga Consolidated, \$19; Exchequer, \$13,090; Alpha Consolidated, \$17,426; Mexican, \$10,514; Julia Consolidated, \$1836; Syndicate, \$9970; Pondera, \$13; Found Treasure, \$1974; Peerless, \$23,357; Crocker, \$16,897; Weldon, \$4548; Consolidated Imperial, \$6294; Belcher, \$19,138; Bullion, \$13,512; North Belle Isle, \$40,000 in crude bullion unsold, with indebtedness of \$1798; Navajo, \$4070; Bulls Isle, \$9189; Independence, \$1987; Standard Consolidated on hand here and New York, \$52,016.

The following mining companies have had an indebtedness on June 1st: Best and Belcher, \$909; Mount Cory, \$49,120; Occidental Consolidated, \$3168; Segregated Belcher, \$24,318; Savage, \$42,357, less the value of 8926 ounces of fine silver on hand and other shipments to be received before the fiscal month closes; Potosi, \$54,673; Chollar, \$25,988, with shipment of bullion to be received before the fiscal month closes; Holmes, \$2033; Utah Consolidated, \$436, with an assessment now being collected; Locomotive, \$5987; Peer, \$209; Nevada Queen, \$22,708; Commonwealth, \$7026; Challenge Consolidated, \$13,347; Grand Prize, \$25,927; North Commonwealth, \$6373; Del Monte, \$5130; Diana, \$3817.

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

RHODE ISLAND M. Co., June 2. Location, Arizona. Capital stock, \$500,000. Directors—Eugene R. Garber, Wm. Minto, L. M. Hoefler, Harry R. White and Chapman Leigh.

MARKET STREET BANK, June 2. Capital stock, \$100,000. Directors—S. E. Grove, Wm. F. Lewis, Worrie C. Lewis, C. P. Butler and A. B. Maynard.

COMMERCIAL ADVERTISING INDICATOR Co., June 5. Capital stock, \$500,000. Directors—Alvan E. Small, Albert W. Jacobs, Francis Jackson, James B. Mackie, Fred D. Brandon, Robert R. Schwell and Robert Jackson.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Eureka Con., June 4, \$17,100; Mt. Diablo, 3, \$4452; Con. California and Virginia, 3, \$85,121 (total to date for May account, \$274,460); Gould and Curry, 2, \$16,608; Hanauer, 1, \$4660; Silver Reef (for May), \$19,578; Germani, 2, \$4703; Hanauer, 2, \$2150; Richmond Con., 2, \$18,353; Savage, 5, \$40,000.

## San Francisco Metal Market.

## WHOLESALE.

THURSDAY, June 7, 1888.	
ANTIMONY—French Star.....	9 @ 9 1/2
BORAX—Refined.....	9 @ 7
Powdered.....	7 @ 7
Concentrated.....	6 @ 7
COPPER.....	26 @ —
Bolt.....	26 @ —
Sheeting.....	26 @ —
Ingot.....	26 @ —
Fire Box Sheets.....	26 @ —
IRON—Gangue Rock.....	26 @ 25
Eglington, ton.....	26 @ 27 00
American Soft, No. 1, ton.....	26 @ 31 00
Oregon Pig, ton.....	21 @ 23 00
Clay Lane White.....	26 @ 23 00
Shott, No. 1, 100 lb.....	26 @ 23 00
Bar Iron (base price) 1/2 lb.....	21 @ —
LEAD—Pig.....	5 @ 50 12
Sheet.....	5 @ 50 50
Shot.....	8 @ —
Bullet.....	8 @ —
Drop, 1/2 bag.....	1 @ 20
Drop, 1/4 bag.....	2 @ 20
Oiled, do.....	0 @ —
STEELE—English, lb.....	15 @ 25
Black Diamond.....	10 @ 20
Pick and Hammer.....	8 @ 8
Machinery.....	4 @ 8
Pec Calk.....	4 @ 8
TRIPPLATE—Coke.....	5 75 @ 6 50
Charcoal.....	6 75 @ 7 25
QUICKSILVER—By the flask.....	37 50 @ 38 50
Flasks, new.....	1 @ 50
Flasks, old.....	35 @ —

## New York Metal Market.

Telegraphic advices dated June 7th give the following New York prices:

BAR SILVER—92c per oz.  
BORAX—9c.  
COPPER LAR—\$16@16.05.  
IRON—No. 1, \$22 00.  
LEAD—\$3.90@—.  
TIN—\$18.60@—.  
The following is the latest by mail from the "New York Metal Exchange Market Report":  
COPPER—Dull, spot closing at \$16.60@16.70. Transferable Notices (Lake) issued at \$16.60@—.  
LEAD—Steady, at \$4.07 spot. Transferable Notices issued at \$4.10.  
TIN—Nominal at \$19.50@—.  
Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery.  
Australian Tin, @—; Billiton Tin, @—;  
Banco Tin, @—; Baltimore Copper, \$14.60@15.40;  
Orford Copper, \$15.60@16.00; P. S. C. Copper, @—;  
Foreign Lead, \$4.60@4.75; Foreign Spelter, \$5.50@5.75; Antimony, \$10.50@14.00.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

# ASSESSMENTS.

COMPANY.	LOCATION.	NO. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Alta M Co.....	Nevada.....	37.	50, May 12, June 18.	July 9. W H Watson.....	302 Montgomery St.
Arnold M Co.....	Arizona.....	4.	75, May 1, June 4.	June 26. A Judson.....	320 Sansome St.
Bulwer Con M Co.....	California.....	4.	20, May 3, June 7.	July 5. L Osborn.....	309 Montgomery St.
Best & Belcher M Co.....	Nevada.....	40.	25, June 5, July 10.	July 31. L Osborn.....	309 Montgomery St.
Bodie Tunnel M Co.....	California.....	15.	23, June 5, July 9.	July 31. C O Harvey.....	303 California St.
Challenge Con M Co.....	California.....	4.	50, May 28, June 29.	July 18. L O McCoy.....	329 Pine St.
California State Co.....	California.....	30.	10, May 11, June 18.	July 10. T Witzl.....	322 Montgomery St.
Diana G & S M Co.....	Nevada.....	7.	10, Apr. 18, May 24.	June 25. J O Hanson.....	10 California St.
Gray Eagle M Co.....	California.....	7.	50, June 5, July 10.	July 31. J W Pew.....	310 Pine St.
Golden Prize M Co.....	Nevada.....	1.	25, May 1, June 2.	June 22. T Wetzel.....	522 Montgomery St.
Justice M Co.....	Nevada.....	40.	25, Apr. 21, May 28.	June 16. O D Bennett.....	323 Montgomery St.
Nye M Co.....	Nevada.....	1.	05, May 7, June 11.	July 2. R E Kelley.....	418 California St.
Occidental Con M Co.....	Nevada.....	2.	20, May 28, July 5.	July 24. W J Dorron.....	401 California St.
Paradise Valley M Co.....	Nevada.....	5.	15, Apr. 21, May 29.	June 18. A K Durbrow.....	309 Montgomery St.
Seg Belcher & Mides Con M Co.....	Nev.....	1.	25, Apr. 21, May 29.	June 18. A Cheminant.....	328 Montgomery St.
Southern Cal Coal & Clay Co.....	Cal.....	1.	10, June 5, July 9.	July 30. E B Holmes.....	309 Montgomery St.
Scorpion M Co.....	Nevada.....	25.	10, May 26, June 25.	July 26. W G Magau.....	10 California St.
Tioga M Co.....	California.....	18.	10, May 15, June 22.	July 16. G R Spinney.....	310 Pine St.
Utah Con M Co.....	Nevada.....	4.	25, May 1, June 5.	June 27. B L Busling.....	309 Montgomery St.
Utah Con M Co.....	Nevada.....	4.	25, May 4, June 8.	June 26. A H Fish.....	303 Montgomery St.

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE
Alabama M. Co.	California.	J. J. Smith.	5th & Stevenson Sts.	Special.	June 11
Bodie Con. M. Co.	California.	G. W. Sessions.	309 Montgomery St.	Annual.	June 15
Gold Piece Gravel M. Co.	California.	J. W. Gleason.	Phelan Block.	Annual.	June 15
Gover M. Co.	California.	L. G. Harvey.	13 Fremont St.	Annual.	June 12
Humboldt M. Co.	Dakota.	C. W. Stamp.	309 Montgomery St.	Annual.	June 16
West Con. C. & Virginia.	Nevada.	J. B. L. Brandt.	306 Pine St.	Annual.	June 27

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con. California & Va. M. Co.	Nevada.	A. W. Havens.	309 Montgomery St.	50.	June 11
Confidence S. M. Co.	Nevada.	A. S. Guth.	200.	2.00.	June 12
Eureka Con. M. Co.	Nevada.	H. R. P. Hutton.	306 Pine St.	25.	June 9
North Belle Isle M. Co.	Nevada.	J. W. Pew.	310 Pine St.	50.	May 7
Con. California & Va. M. Co.	Nevada.	J. P. Lightner.	309 Montgomery St.	50.	May 7
Oregon Coal & Navigation Co.	Oregon.	R. B. Williams.	211 Sansome St.	1.50.	Mar 2
Pacific Borax, Salt & Soda Co.	California.	A. H. Clough.	230 Montgomery St.	1.00.	Jun 11
Standard Con. M. Co.	California.	J. W. Pew.	310 Pine St.	65.	June 12

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING May 17.	WEEK ENDING May 24.	WEEK ENDING May 31.	WEEK ENDING June 7.
Alpha.....	1.70	2.05	1.70	2.05
Alta.....	1.20	1.60	1.10	1.25
Andes.....	1.35	1.40	1.30	1.50
Argenta.....	5.25	6.75	4.75	6.75
Belcher.....	4.30	4.65	4.00	4.50
Best & Belcher.....	1.35	1.60	1.40	1.50
Bullion.....	55	70	50	85
Baltimore.....	40	55	65	70
Belle Isle.....	2.45	2.80	2.50	2.85
Bodie Con.....	2.00	1.75	1.75	1.75
Bodie Tunnel.....	1.50	1.70	1.65	1.70
Bulwer.....	5.75	6.75	5.25	6.75
Chollar.....	3.35	4.50	3.60	4.00
Confidence.....	31	32	29	35
Con. Imperial.....	40	50	40	50
Caledonia.....	40	50	40	50
Con. Pacific.....	55	65	50	60
Crown Point.....	1.20	1.60	1.15	1.35
Crocker.....	35	50	35	45
Central.....	35	50	35	45
Dudley.....	35	50	35	45
East B. & E.....	1.00	1.00	1.00	1.00
Eureka Con.....	1.00	1.00	1.00	1.00
Exchequer.....	1.30	1.15	1.30	1.05
Grand Prize.....	2.15	2.25	2.15	2.25
Gould & Curry.....	4.20	4.50	4.10	4.35
Hale & Norcross.....	71	81	72	80
Holmes.....	1.50	1.50	1.50	1.50
Independence.....	95	1.05	1.00	1.05
Iowa.....	40	50	40	50
Julia.....	40	50	40	50
Justice.....	75	85	75	85
Keutuck.....	2.70	3.20	2.25	2.90
Lady Wash.....	35	40	35	40
Martin White.....	1.65	1.75	1.60	1.70
Mono.....	4.25	4.50	4.10	4.30
Mexican.....	1.55	1.85	1.80	2.25
Mt. Diablo.....	3.50	3.50	3.50	3.75
North Belle.....	1.55	1.85	1.80	2.25
Navajo.....	4.00	4.65	3.90	4.25
Nev. Queen.....	3.50	3.85	3.80	4.15
North B. & O.....	1.30	1.45	1.25	1.30
Occidental.....	7.00	8.25	7.50	8.00
Ophir.....	1.85	2.10	1.75	2.00
Overman.....	3.70	4.25	3.55	4.00
Potosi.....	2.10	3.15	3.00	3.40
Peerless.....	60	1.20	90	1.20
P. Sheridan.....	4.50	5.25	4.55	4.90
Silver Star.....	4.50	5.25	4.55	4.90
Savage.....	3.30	4.30	3.75	4.40
S. B. & M.....	55	65	50	60
Sierra Nevada.....	3.30	4.30	3.75	4.40
Silver Hill.....	55	65	50	60
Silver King.....	60	65	55	65
Scorpion.....	3.15	5.55	3.25	3.70
Syndicate.....	1.45	1.65	1.35	1.65
Union Con.....	5.75	6.50	5.65	6.40
Utah.....	5.75	6.50	5.65	6.40
Yellow Jacket.....	5.75	6.50	5.65	6.40

## Sales at San Francisco Stock Exchange.

WEDNESDAY June 6.	400	Grand Prize.....	2.05
150 Alpha.....	1.25	370 Hale & Nor.....	6.05
800 Alta.....	750	250 Justice.....	6.05
500 Andes.....	950	250 Mexican.....	2.95
400 Baltimore.....	650	220 N. Belle.....	3.20
400 Belcher.....	3.50	720 Ophir.....	8.00
470 B. & Belcher.....	3.00	1000 Overman.....	1.20
600 Bullion.....	950	130 Occidental Con.....	1.00
100 Bodie.....	2.20	300 Peerless.....	2.00
100 Bodie.....	700	100 Peer.....	6.05
470 Bodie.....	500	505 Potosi.....	2.55
400 Challenge.....	3.10	200 Silver Hill.....	4.55
510 Chollar.....	3.05	600 Savage.....	4.55
535 Con. Va. & Cal.....	94	615 Scorpion.....	3.05
100 Crocker.....	950	525 S. B. & M.....	2.05
470 Crown Point.....	3.9	420 Sierra Nevada.....	2.95
150 Con. Imperial.....	300	200 Union Con.....	2.75
90 Confidence.....	17	200 Utah.....	1.15
100 Exchequer.....	850	150 Weldon.....	5.05
500 Gould & Curry.....	2.80	320 Yellow Jacket.....	3.75

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

J. O. H. LAMPADUS—Santa Barbara Co.  
G. W. INOARD—Arizona Territory.  
A. F. JEWETT—Tulare Co.  
C. E. WILLIAMS—Yuba and Sutter Co's.  
R. O. HUSTON—Montana Territory.  
W. M. WILKINSON—Butte and Tohama Co's.  
J. L. DOYLE—Kern Co.  
W. W. THEOBALDS—Contra Costa Co.

SEVERAL additional complaints have been sent to the Chief of Police concerning the operation of the Globe Patent Co. in this city. Eastern inventors had sent the company money in amounts from \$20 to \$60, in connection with the sale of their patents, and never heard of any results.

## DELINQUENT NOTICE.

## Butte Creek Hydraulic Mining Company.

Location of principal place of business, 213 Market St., San Francisco, Cal. Location of works, Butte county, California.

NOTICE—There are delinquent, upon the following described stock, on account of Assessment No. 12, levied on the 27th day of March, 1888, the several amounts set opposite the names of the respective Shareholders, as follows:

Names.	No. Certificates.	No. Shares.	Amount.
J. D. Dexter, Tr.	48	100	5 00
J. D. Dexter, Tr.	48	100	5 00
J. D. Dexter, Tr.	49	100	6 00
J. D. Dexter, Tr.	63	500	25 00
Ed. Dexter, Tr.	50	500	\$ 25 00
Chas. Moss.....	92	500	25 00
B. Frank Moss.....	90	500	25 00

And in accordance with law, and an order of the Board of Directors, made on the 27th day of March, 1888, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Market street, San Francisco, Cal, on Monday, the 28th day of May, 1888, at the hour of 1 o'clock P. M., of said day, to pay Delinquent Assessments thereon, together with costs of advertising and expenses of the sale.

LOUIS R. LEVY, Secretary.

OFFICE—213 Market St., San Francisco, Cal.

## POSTPONEMENT.

The above sale day is hereby postponed to MONDAY, June 11, 1888, at the same hour and place. By order of the Board of Directors.

LOUIS R. LEVY, Secy.

## MEETING NOTICE.

Office of the Alabama Mining Company, Corner of Fifth and Stevenson streets, San Francisco, California, May 12, 1888. Location of works, near Newcastle, Placer county, California.

NOTICE is hereby given to all the Stockholders of said Alabama Mining Company (a corporation) that there will be a general meeting of the Stockholders of said company held at the office of said company at the S. W. corner of Fifth and Stevenson streets, in the city of San Francisco, Cal., on Monday, the 11th day of June, A. D. 1888, at the hour of 1 o'clock P. M. of said day, for the purpose of removing from office the following named Directors of said company, to wit: Owen King, William Reinhold, Samuel Jones and Michael Hoffman, and for the further purpose of filling by election then and there the vacancies that may be caused in the Board of Directors by such removals.

The undersigned is the owner of more than two-thirds of the capital stock of said corporation, as well as a Director and President of said Company, and makes this call under the provisions of Section 310 of the Civil Code.

J. J. SMITH,

President of the Alabama Mining Company.

## Jewey &amp; Co.'s Scientific Press Patent Agency.



OUR U. S. AND FOREIGN PATENT AGENCY presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American and foreign reports, files of scientific and mechanical publications, etc. All worthy inventions patented through our Agency will have the benefit of an illustration or a description in the MINING AND SCIENTIFIC PRESS. We transact every branch of Patent business, and obtain Patents in all countries which grant protection to inventors. The large majority of U. S. and Foreign Patents issued to inventors on the Pacific Coast have been obtained through our Agency. We can give the best and most reliable advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and Circulars free.

DEWEY & CO., Patent Agents.

No. 220 Market St. Elevator 12 Front St. S. F. Telephone No. 658.

A. T. DEWEY. W. B. EWER. GEO. H. STRONO.

## MINING MEN

## And the Public Generally!





## ELECTRIC DEVELOPMENT COMPANY.

### Incandescent & Arc Electric Lights.

Electric Motors, Dynamos, Trancars, Elevators, Signals and all kinds of Electrical Systems for lighting and transmission of power, either direct or with storage Batteries.

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Indoor and Outdoor Illumination of every kind. Gas, Oil and Candles superseded by the

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—IMPORTERS AND MANUFACTURERS OF—

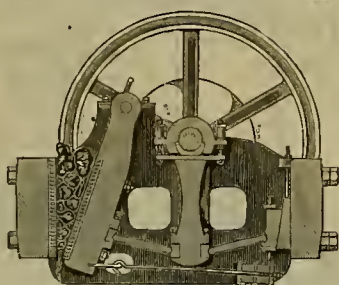
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ENGINES,

BOILERS,

STEAM

PUMPS.



GIANT ROCK BREAKER.

ROCK

BREAKERS,

PULVERIZERS,

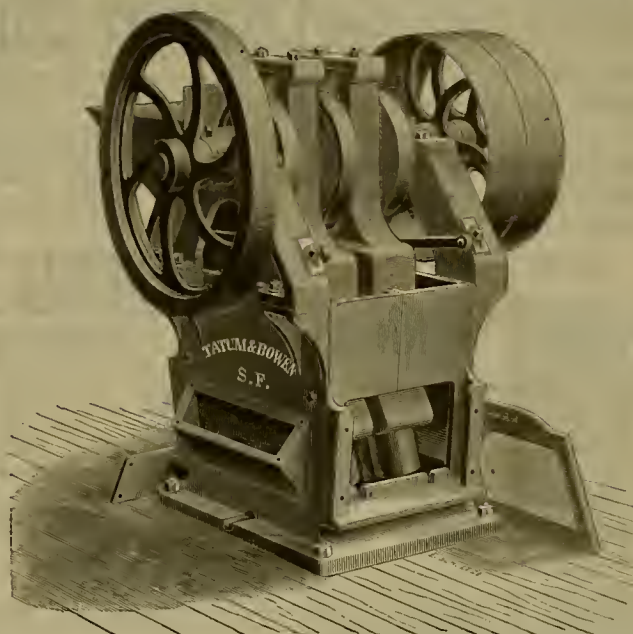
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Westinghouse "Standard" and "Junior" Engines, Rock Drills and Air Compressors. Saw and Planing Mill Machinery, Machine Tools, Governors, Injectors, Oil Cups, and Lubricators.

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We are prepared to give estimates for Hoisting Works and Pumping Plants, Stamp Mills, Smelters and Concentrators.

## THE DOUBLE "ECONOMIC" STAMP MILL.



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

## AN AUTOMATIC ORE FEEDER

Goes with each Mill. We also have a suitable

### Rock Breaker.

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

**TATUM & BOWEN,**

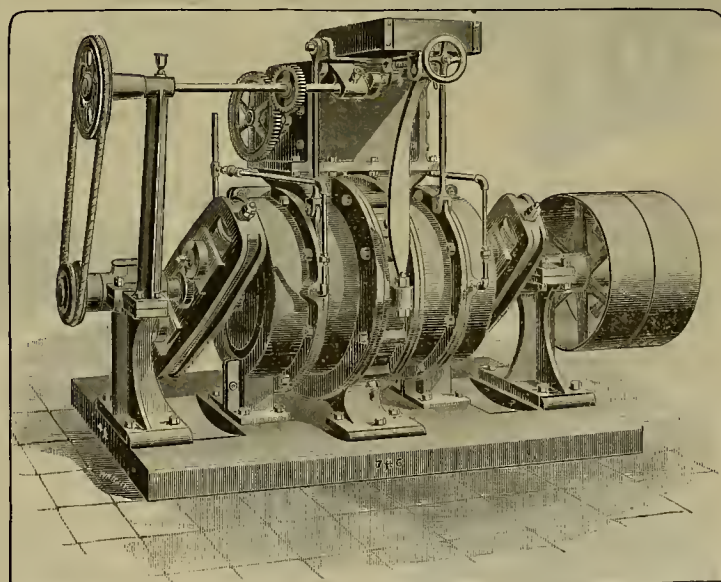
34 and 36 FREMONT STREET,

SAN FRANCISCO, CAL

Manufacturers of Mining and Sawmill Machinery, Engines, Boilers, Etc.

## FRISBEE WET MILL.

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.

OUR DRY MILLS are the most economical ever built, and are extensively used with record of several years. No grinding in pans. Mill finishes to any fineness desired.

## FRISBEE-LUCOP MILL COMPANY,

GIDEON FRISBEE, Manager, - - - 461 Howard St., San Francisco  
 HOOKER & LAWRENCE, Gen'l Ag'ts, 145 Broadway, New York.



## ARE YOU GOING TO PUT UP MACHINERY OF ANY KIND?

Are you going to make any change in machinery? Are you freighting by team or packing on mules? Do you want Pulleys on Shafting already up? If so, don't fail to look into the merits of

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They are the Lightest, Strongest, Best Balanced and Most Convenient Pulleys Made in the World.

Entirely new and original. Adapted to any power required. Time, trouble and money saved by using these pulleys. Also Agent for the DODGE SYSTEM OF ROPE TRANSMISSION. Estimates furnished. Price List and Catalogues mailed free.

JOHN SIMONDS, Pacific Coast Agent, 509-513 Mission St., S. F.

## N. W. SPAULDING SAW COMPANY

Manufacturers of SPAULDING'S

Inserted Tooth

AND

CHISEL BIT CIRCULAR

## Saws.

SAW MILLS AND MACHINERY Of all kinds made to order. Send for Descriptive Catalogue. 17 and 19 Fremont St., San Francisco.

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Revolving, Jetting, Hydraulic, Diamond, Prospecting Well Tools, Wind Engines and Deep Well Pumps. Treatise on Natural Gas, or our Encyclopedia, mailed for \$5. The American Well Works, Aurora, Ill.



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Section 16x16 feet; Length 36 miles.

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No imitation, no deception, no planished or rotten iron used. Only genuine Russia iron in Quartz Screens. Planished iron screens at nearly half my former rates. I have a large supply of Battery Screens on hand suitable for the Huntington and all Stamp Mills, which I will sell at 20 per cent discount.



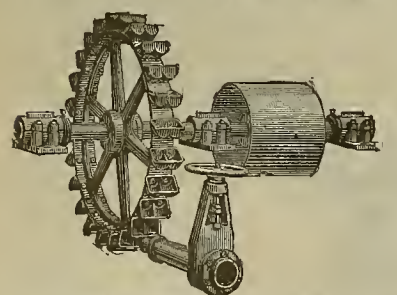
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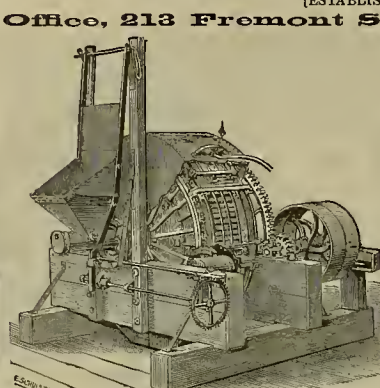
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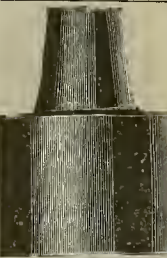
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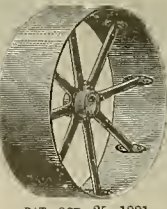
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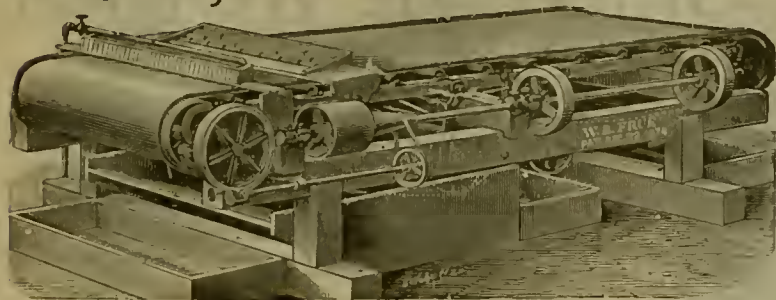
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N. B.—Since the above was written the 50 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

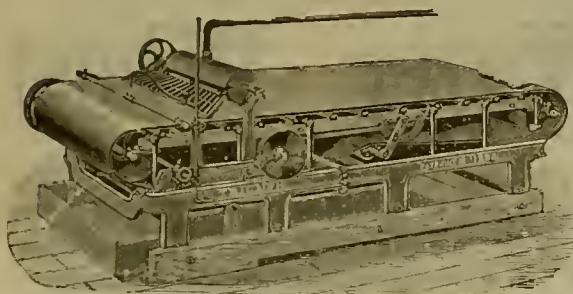
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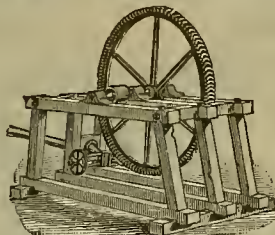
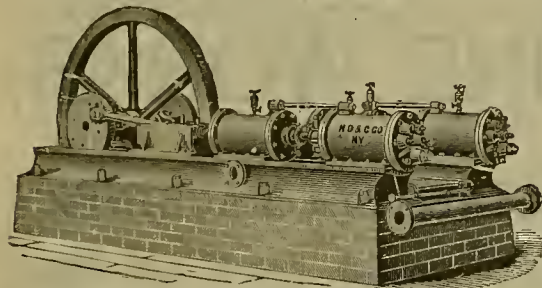
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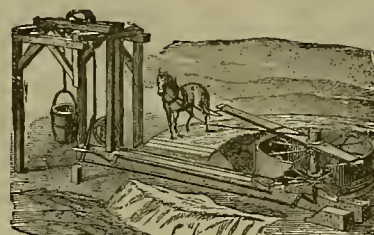
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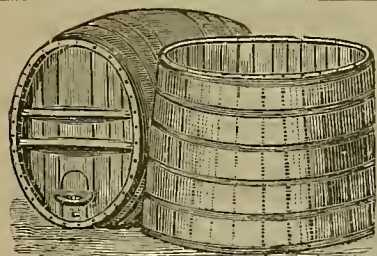
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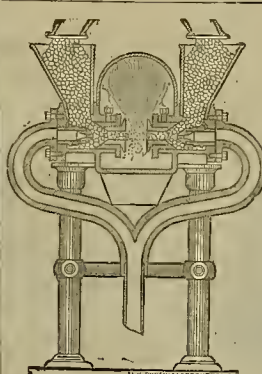


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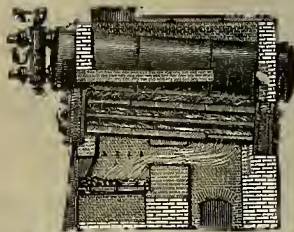
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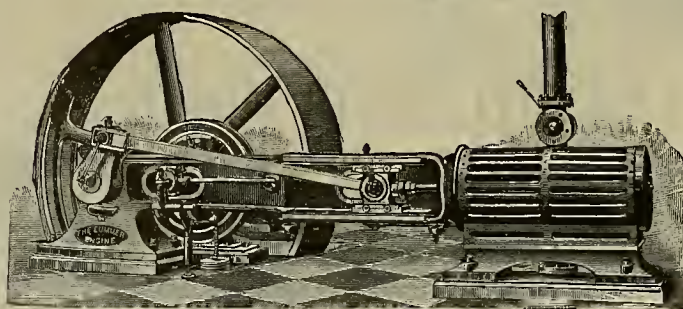
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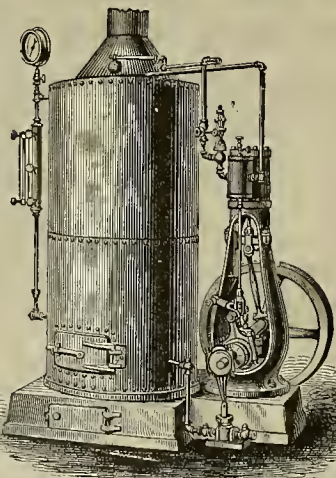
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An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
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SAN FRANCISCO, SATURDAY, JUNE 16, 1888.

VOLUME LV.  
Number 24.

## Square Smelting Furnaces.

All the furnaces at Leadville, Colorado, are built on the same general principles and contain the same essential parts, but they belong to two distinct styles—the rectangular or square and the circular. We give on this page an engraving of the square furnace, which we take from Emmons' U. S. Geological Survey Monogram on the Mining Industry of Leadville, having previously illustrated one of the circular furnaces. In the engraving Fig. 1 is an elevation; Fig. 2, horizontal sectional tuyeres; Fig. 3, vertical section through slag-gutter; Fig. 4, horizontal section at charging floor.

The general appearance of these furnaces is that represented in elevation, Fig. 1. The furnace is formed of two independent parts: (1) The masonry, *C*, supported on a main cast-iron plate support, *D*, resting on cast-iron pillars, *P*. (2) The crucible *A*, upon which rest the water-jackets, *B*. The space between the water-jackets and the masonry is filled up with fire-brick, *b*. The arrangement is most convenient for repairs of parts exposed to injury or destruction. It is universally adopted in the camp. The masonry is firmly bound by braces, *Q*, the system adopted for bracing varying with almost every furnace. Immediately above the feeding floor, *P'* are to be seen the feed-holes, *H*, provided with sliding doors, *S'*. The smelting charges are thrown into the furnace through these holes.

The different parts of the masonry are the following (see vertical section Fig. 3): *C* is the shaft of the furnace. The portion of the shaft immediately below the feed-holes is called the throat. It can also be seen in horizontal section in Fig. 4. *D* is the chimney and *E* the stack; this stack can be opened or closed by means of the damper *G*. The stack is also connected with the dust-condensing chambers by means of the sheet-iron flue *F'*. The walls of the furnace are represented by *C'*. The wall placed above the slag-gutter *U*, which is always considered the front part of the furnace, is called the front wall. The opposite wall, at the rear, is the back wall; on each side are the side walls in which apertures are provided for the feed-holes. A wooden hood *W* and chimney *W'* are placed in front of the furnace and above the slag-gutter to carry off the fumes from slags. The crucible *A* is formed of strong cast-iron plates *a*, firmly screwed and bolted together, and it is covered with a cast-iron plate. The crucible is lined with fire-brick or steep (brasque). In front of the crucible projects the fore-hearth *X*, to which is adapted the slag-gutter *U*. On one side of the crucible is placed the lead-pot *L*, communicating with the hearth or crucible *A'* (Figs. 1, 2 and 3) by means of the siphon *L'*.

This arrangement is called the syphon lap or automatic lap, and constitutes one of the greatest improvements ever introduced in the construction of blast furnaces, for, by its means, lead keeps always at the same level, and thus escapes as much as possible the oxidizing action of the blast. The lead pot is always inclosed in a cast or wrought-iron box or frame, *a'*, projecting outside of the crucible. The portion of the hearth designated by *A''* (Fig. 3) is the dam. *X'* is the steep of which the hearth, fore-hearth and lead-pot are made. In an article in another column of the PRESS will be found a decision of the United States Circuit Court establishing the validity of the patent

on this device which has been contested. Messrs. Keyes and Arents of San Francisco are the original inventors.

The water-jackets, *B*, constitute also one of the greatest improvements ever introduced in the construction of blast furnaces. When properly cared for they never get injured; occasionally they may get shifted or spring a

nares need important repairs. The sectional disposition admits of the expansion and contraction of this portion of the furnace without altering the relative position of the parts, and on this account must be highly commended.

In the furnace under description there are 12 jackets, called the front or breast jackets, two at the back and four on each side. In horizon-

pipe, *M*. In Leadville the tuyeres are never supplied with any special arrangement for cooling than by water, for the reason that the water-jackets act as coolers of the tuyeres. The tuyeres are generally made of thin galvanized iron, provided with sliding-valves, used to observe the interior of the furnace, and also as safety valves, for they are left partially opened. The front jackets are always provided with an open space, which is closed with a plug of capping clay. This plug is called the tympan-stone. The tap-hole is perforated through the tympan-stone for the exit of the molten slag.

## The Lead-Well Patent Valid.

In the Circuit Court of the United States at Denver, Justice Miller last week rendered a decision in the suit brought by W. S. Keyes and Albert Arents of this city against the Pueblo Smelting and Refining Co. of Colorado. The suit was brought for infringement of a patented improvement in smelting furnaces known as the lead-well or automatic tap, commonly called the siphon tap. The complainants sought to recover damages for the use of 13 furnaces for a period of six years, amounting, as claimed, to the sum of \$195,000, exclusive of the triple damages provided for by the patent laws. This case involved about the same principles as the suit by the same patentees against the Grant Smelter, which went to the Supreme Court of the United States, except that that was a suit at law and this is in chancery. This goes into the merits of the case.

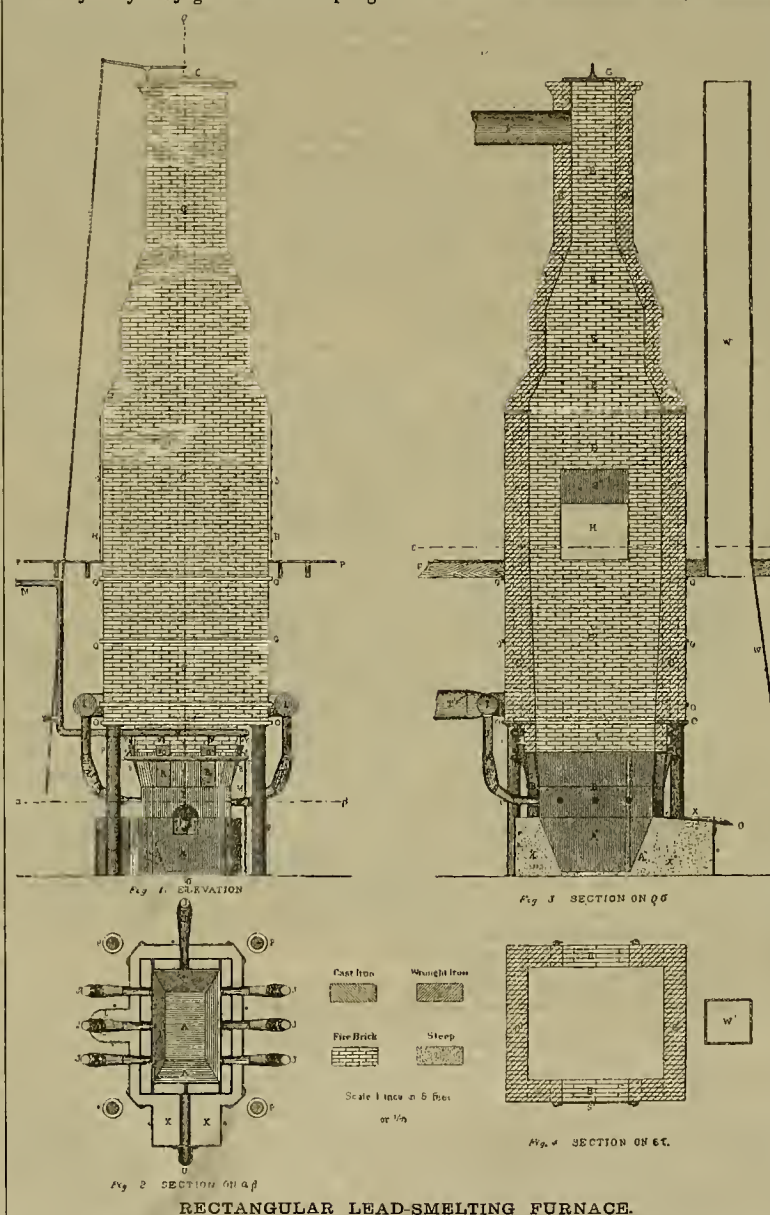
Justice Miller's summing up of the case is quite extended. The gist of it is, however, given in the concluding sentences as follows:

"I will make an order that the patent is a valid patent; that the defendants have infringed it, and that the plaintiffs are entitled to an injunction and to compensation for its use. Reference to a master will be made to ascertain the compensation of the plaintiffs. These views settle the whole case."

This is one of the important California inventions which has been applied to metallurgy. It is used all over the United States where lead smelting is carried on. The defendants in the above case endeavored to show that Karsten's furnace anticipated it, but in this they were unsuccessful. Justin Miller is one of the best posted men on patent matters in the United States, and his decision is highly important. This will be a lesson to those persons who unlawfully use inventions without compensation to the patentees. Robt. E. Foot of Denver was the attorney for the California inventors.

SENATOR STEWART of Nevada is still pegging away at the lead ore proposition. He is determined to know whether or not it is, by any construction of the law, coming in free. He has presented a resolution instructing the Judiciary Committee to inquire and report whether under the Act of March 3, 1883, lead ore is exempt from duty if it shall contain gold greater in value than the value of the lead in the ore.

PAT. HENLEY and William Kelley were injured by an explosion at the St. Lawrence mine, Butte, M. T., Friday, and Kelly will probably lose his sight. The St. Lawrence is the mine in which a great cave occurred a few days ago, burying a number of miners, who were rescued with difficulty.



RECTANGULAR LEAD-SMELTING FURNACE.

leak between the joints, but this rarely affects the jackets themselves. It is sufficient to state that smelting campaigns of 13 months are known in Leadville, to give an idea of the importance of this arrangement.

The water-jackets, *B*, are hollow boxes, indicated in elevation, Fig. 1, and in section, Fig. 3. They are made of cast iron, wrought iron or steel boiler-plates. In the water-jackets water can circulate freely, so that the temperature of this portion of the furnace wall, when the most intense heat reigns in the interior, never exceeds 60° or 70° C. The water-jacket arrangement is always sectional, so as to afford every facility for the removal of the jackets when the fur-

tal section, Fig. 2, the manner in which they are formed is shown very clearly. The jackets are very firmly screwed, bolted and braced together. Each jacket is provided with one or more circular apertures for the introduction of the nozzles of the tuyeres. In Fig. 2 the arrangement and disposition of the tuyeres is plainly seen. Each jacket is provided with a cast-iron feeder, *R*, forming an integral portion of the jacket and cast with it for the introduction of water. Small pipes, *S*, screwed to the feeders, act as outlets for the hot water, which is carried away by the water-gutter, *T*. Cold water is introduced in the feeders by means of the taps, *Y*, supplied from the main water



## CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—EDS.

## Murphys and Vicinity.

EDITORS PRESS:—The Mitchell placer mines of Vallecito are being put in shape for extensive work. The gravel in this district embraced in these mines is of unknown depth, and until now no plan has been put into operation to work these deposits, though many have been devised. It is a question if in the end it is not found necessary to tap this old river channel by a long tunnel from the Stanislaus river. That the gold is there and that in abundance has been repeatedly proven by the dirt washed from the deep shoals. If further proof were needed the shrewdness of three Italians on the adjoining Mansker ranch would convince the most skeptical. These Italians put down a shaft last fall; failing in their application for a mining patent, they applied to the owner of the ranch, Mr. Manaker, and secured the right to mine on the ground beneath the ranch. Once secure they showed pieces of gold weighing up in the ponds. One piece taken out the past week weighing 48 ounces, and this but one of many. Just what amount of gold they clean up is not known, as they only show an occasional piece to their friends. This gravel deposit extends from Vallecito to Murphys, is of an average width of a half-mile, and supposed to be between 100 to 300 feet deep.

The Central Hill hydraulic mines are the Murphys end of the Vallecito and Douglas deposit. McCormick & Bisbee are pushing the Central Hill property for all there is in it, and while they say but little, the general understanding is that the mines are paying handsomely, though laboring under the disadvantage of a poor dump. Once this old river is opened with a tunnel tapping it at the lowest point, the section will prove a perfect bonanza. In quartz, the work of this neighborhood partakes of development. On San Domingo, Mr. James Taylor is putting down an air shaft, and promises to show up "the biggest mine in the section by next fall." West of town the Mattison's are driving away to crosscut the Beatrice. Should the vein approach in richness anywhere near the owners' expectations, the Beatrice will be more than beatific; the ledge is large, and all the work done shows ore of very good quality. Further west Mr. Sublett, patient, persevering Sublett, is driving ahead on the same lead to strike a rich chute. If Sublett does not succeed, it will not be from want of trial, as he has put in eight years of faithful prospecting in that immediate neighborhood.

Southeast of town Messrs. Heard & Harris are sinking on the old Bavarian ledge, with good prospects. Just across the creek, Messrs. Dussell & Heindorff are quietly pounding out a big thing from pocket quartz. To the west of town, McPrage Bros. are sinking and milling rock from the old Black mine; across the gulch Strass & Stone are preparing to sink an additional 50 feet on one of their locations. A recent mill run on their mines shows the concentrates to average \$1400 to the ton. As the rock glistens with sulphurets, some idea can be formed of the possible future of these properties. Still further east are the mines of Goodwin, Dorsey & Mattison on the Stanislaus. As the hills hang out at the top in that section, the writer has not visited them lately. Reports have it that work is being pushed on all the mines. Should all the leads prove as valuable as the Snell—one of Senator Dorsey's group—the section will soon make a record. This, the Snell, is a four-foot ledge of \$35 free gold rock, very easily mined and milled, but is idle in consequence of the difference of opinion as to the values. Murphys is slow in "getting there," but once she "gets there," it will be to stay, and don't forget it.

E. H. SCHAEFFLE,

Murphys, Calaveras Co.

## A Wrinkle on Rock-Breakers.

EDITORS PRESS:—I presume that every one who has used the Blake style of rock-breaker to any extent have, at some time or other, found themselves in a predicament for want of a rubber spring—the one used to keep the vibrating jaw open.

I recently saw in Mexico, the land of make-shifts, a substitute for the rubber spring. It is simple and effective. The contrivance is a spring-rod attached to the rod (which has been lengthened for the purpose), to which the rubber spring is attached. When the rock-breaker is placed above a storage bin there is ample room to make the pole of sufficient length to give it a good spring.

E. C. VAN BLARCOM,  
Oakland, June 12, 1888.

## Como, Nevada.

EDITORS PRESS:—Como is able to toot her horn once more, and it is time you were hearing from us. After a period of inactivity of nearly a year's duration, the Eureka Como mine steamed up on the 27th ult. and blew her whistle, making the surrounding hills reverberate with the welcome sound.

This mine is under the management of a new company, and the name was changed from

Como Eureka to the present one. This company have spent about \$6000 during the past two months in machinery and repairs, and are now about ready to begin sinking their shaft deeper. They mean business, and before many months there will probably be a mining boom on at Como.

This district is known as Palmyra and Indian Springs mining district and contains several square miles of mineral ground. Population at present, about 25; elevation, 7600 feet. Should we continue to increase and prosper, you may hear from us again.

"CHROMO."

## New World District, Montana.

EDITORS PRESS:—The New World mining district, as it is called, is situated on the headwaters of the Stillwater, Clarke forks, 20 miles northeast from the east fork of the Yellowstone river, and four miles east from the east line of the National Park.

Cook City is our district-seat and postoffice, while Lexington, Montana, is our county-seat of Park county. The altitude of Cooke is about 7500 feet above sea level, while our mines range from 10,000 to 10,500.

A majority of the ore of the camp is galena and carbonate, yet we have some milling rock. Transportation has been our main obstacle; we are 60 miles from a railroad.

The present freight rates are \$20 per ton on incoming coke; the same on outgoing hullion, being equal to \$40 per ton on every ton of hullion that is shipped from the camp.

Outside of the transportation question our camp never looked more promising, but the present railroad view is very flattering for the near future.

To make mention of all of the prospects of the district would require too much space and time, so permit me to only name a few of the mines, giving the names and developing work done on each.

The Black Warrior lode has shaft No. 1 down 56 feet, all in ore; shaft No. 2 sunk something over 100 feet, all in ore connected by a tunnel; the extent of the ore body is not known. The ore is composed of galena and carbonate. The assay value samples about \$40 in silver and gold with a good percentage of lead.

The White Warrior lode has a tunnel of 250 feet on ore, tapping the ore vein at the depth of about 250 feet from the surface. This claim now has a three-foot solid vein of galena and carbonate and will sample \$50 in silver and gold with lead from 30 to 40 per cent.

The Keystone lode runs a 100-foot tunnel, tapping a three-foot vein at a depth of 75 feet from surface, thence drifted on vein 30 feet, and sunk at end of tunnel 20 feet. The ore at this point was the width of shaft. The ore is galena and carbonate, the value of which is unknown to the writer.

The Alice E lode has a tunnel of 60 feet in solid ore and shaft now down 20 feet in ore, the nature of which is decomposed honeycomb quartz, being milling rock. The ore in the tunnel samples \$10 in gold, while that from the shaft runs from \$40 to \$330 in gold and silver.

The Morning Star lode is represented by tunnel No. 1 of 160 feet, tapping it on vein something over 100 feet from the surface. They put in station at the end of tunnel and sunk a winze No. 1 of 50 feet, thence drifted 40 feet on ore; put in another station and sunk winze No. 2 50 feet on ore.

Winze No. 2 was sampled from top to bottom. Five assays were made which run from \$119 to \$195 in silver and gold and 40 per cent in lead. Tunnel No. 2 is now in 403 feet, tapping the cross vein at a depth of 260 feet from surface. The intention of tunnel No. 2 is to tap ore body under winze No. 2 and connect with same. Work is progressing as fast as time will admit. It would be safe to say the pay ore vein will average about three feet in width from grass roots the entire 260 feet. While the ore so far has been galena and carbonate, the last extracted showed a new feature and the owners think it the best ever taken out heretofore.

We have many other prospects which we would be glad to mention but will save for future reference.

JESSIE.

The working force of the San Francisco copper mine at Spenceville, Nevada county, has been increased. The new owners intend to improve on the property and will do a great deal more work in the future than in the past. New shafts will be sunk as soon as practicable, and several new buildings, necessary for the prosecution of the increased work and supply of ore, will be erected.

It is reported in Victoria, B. C., that a controlling interest in the Bearnest mine in Alaska has been finally transferred to an English company for \$1,500,000. Hamilton Smith of London and Henry Janin of New York left for Alaska by the last steamer in the interest of the purchasers.

THE PARADISE VALLEY MINE.—Very encouraging reports are received from the Paradise Valley mine. Ore is being found in new ground on several levels, and the indications are favorable for ore bodies similar to those heretofore worked, when the mine was paying dividends.

## The Expression of Our Movements.

(Continued from Issue of May 26th.)

[Translated for the Press from the French by M. N. M.]

Without undertaking to pass in review here all the characters that the walk can present, we resume what we have to say. The calmness, the regularity, the rectitude of the walk, indicates a nature temperate, mistress of itself, firm of will. Agitation, irregularity, uncertainty, are so many contrary indications.

We can apply the same observations to the transitory state in which the pedestrian finds himself. Walking in a direct line toward a person or thing manifests frankness, boldness, courage, confidence; the walk sideways or tortuous betrays fear, insincerity, hatred and treachery. Here again the symbolism is visible, almost literal; it materializes in a form and in a movement the state of sympathy or of antipathy, of expansion or of contraction, which compels the person to act. Moreover, it is not only in human beings that we observe that. Look at the wild animals in their mistrusts or in their wiles; observe the dog when he meditates a theft or an intention to bite; the cat that watches the mouse; notice the wolf, whose name has served to make the verb "loupoyer" (to tack) a word used to define the course of a ship which has not a favorable wind and which orients (trims) its sails upon the different angles in order to advance sideways, and expresses likewise in its metaphorical acceptance, the tortuous ways of attaining an end which one conceals without appearing to do so.

Accessory movements develop new effects. A timid man in walking will hold his arms almost immovable; a bully will turn them like the fans of a mill; another will roll his trunk upon his loins, will disjoint his shoulders, and he is said to hip himself in walking and to be ill-jointed.

We need go no further. These observations anticipate what we have to say of the gait. It will be proper to remark, however, that the slow, hesitating, spiritless walk indicates a feeble character, or a depressed condition like that of physical or mental suffering; that a quick, light walk is a sign of healthiness of the body or of cheerfulness of mind; and that the upright and sincere man walks straight forward, while the hypocrite, the man who fears, or dare not, glides sideways.

## As to Running.

Its accelerated nature restricts expression to sentiments sudden and very energetic. In the usual metaphorical language, in place of saying that one goes, it is said that one runs when the question is of an act done with ardor. "I run to give warning, I run to throw myself in his arms; to run to glory, to pleasure, etc." To run does not even always suffice, and in certain cases still more urgent, one says: "I fly to your feet; I fly to new combats," etc.

The depressive sentiments translate themselves also by the rapid run, but in this case it is to get out of the way of the object instead of to run toward it. Fear, as every one knows, gives legs to the greatest poltroon. I have, however, read in a work macaronic that running away implies even a certain degree of courage, because when one has overmuch fear the legs fail. The observation is very just, and it gives occasion to remark that the great emotions, when they exceed a certain measure, indefinitely abate the velocity of the walk, and that when they are sudden or excessive, they can arrest it entirely.

As collective action, the walk now regulated with reference to a certain rhythm now executed en masse, make part of the rites and ceremonies which are traits of manners peculiar to the human species. Religion, war, and the great events of life, are celebrated by walks of a solemn character. These manifestations approach elsewhere to the dance, of which we shall have to speak further, but we ought to indicate here the place to which they belong.

## The Gait.

If we properly observe to call things by their names, that of gait will apply only to the characteristic manner of walking considered as expressing such state or such sensibility as may be habitual to such person. It is habit, it is the persistent character of walking in such or such a manner that constitutes the gait. This is how in current language we are led to confound them, and this is what for us should serve to distinguish them. Nevertheless, we must admit that the distinction is a nice one to attend to, and one may slip at each step when one seeks to hold himself exactly upon the line of demarcation which separates them; that is seen above where we had to stop, because in speaking of the walk we began to encroach upon the gait.

As we were saying, pertinent to this, the walk, independently of qualities of amplitude, of rapidity, and of regularity, which are in some way the essential and purely mechanical part of it, is always accompanied by accessory movements, by dispositions, it may be of the head, it may be of the body, which accord with it, and which we are not able to detach in order to consider them apart, so that it is true to say there is no walk without gait. But it is precisely that ensemble which, when it comes to take an expression and an accent very clear and very significant, becomes the expressive action that we call gait. Look at the passers on the street; there are a lot of them who walk in the same manner; one goes fast, another slow;

that one walks with steps counted, this with strides unequal. The young skip; the head and eyes always in requisition and their arms beating the air like wings; the old and the diseased stoop the head, bend the back, let the arms hang down, drag the feet, and walk curved, like street-porters, under the weight of life. The healthy hasten on with an air of good humor, their heads thrown back, arms rounded, leg stretched forth, eyes brilliant, and month smiling. The wealthy walk in nearly the same manner, so that it is not always easy for physiognomists and philosophers to distinguish merely from the gait, whether the felicity of the happy man who goes by is the result of nature or good fortune.

## Sorrrows. Misfortunes, Hardships,

Travels, and wretchedness; everything that makes the burden and weariness of life impresses on the gait the same accent of dejection, of languor, of slowness, of ruin, as do age and disease. We find, moreover, the same signs that we have remarked in the human figure, in the case in which, under the action of a transient cause, it expresses suffering, or a depressive sentiment; but there is here this difference that the sign is henceforth ineffaceable; it has become incorporated, and like an arch broken under strains too violent, a person is no longer able to become straight again. Character in the gait manifests itself with no less of evidence than age, the state of health, or the conditions of life, according as it is open or concentrated, feeble or energetic, sincere or dissembling, sad or gay, indecisive or resolute, and translates in symbolical signs these various qualities, sometimes by the breadth, vigor, frankness, grace and precision of movement; at others by their meanness, effeminacy, want of grace and hesitation. With the exception of that which the mechanical and static necessities of the walk necessarily change in it, the gait may be considered as an attitude in a kind of particular movement, because in spite of these modifications we can say that for every one of the divers states of the soul, the gait and the attitude, save the movement of the legs, are similar; that is to say, that the parts of the visage and of the body execute the same movements. Thus, a proud man for example, a man irascible, and a timid one hold and move themselves in their gait in the same manner as they do in an attitude of repose, and pride, anger and timidity express themselves by the same signs in a man who has not habitually these defects, their bodies assuming the same disposition. There is no utility in extending these observations further. It will suffice to refer to what we have said of the various kinds of expressive movements to see that we can apply it with as much detail and precision, to the analysis and esthetic of the gait.

(To be Continued)

It is stated that the Humboldt and Mendocino Lumbermen Association has decided to shut down all mills for one week each month during the summer. The object, as stated, is to keep the supply down to the demand. The demand for lumber from the southern part of the State has fallen off materially. The mills that are closed are mostly in the redwood region. The mills that closed last week are the following: Humboldt Mill and Lumber Co., at North Fork; Chandler, Jackson & Co., North Fork; Minor, Kirk & Co., Warren Creek; and the Milford Land and Lumber Co.'s mill at Salmon Creek. Those which shut down this week are: Vance's, at Mad river; Minor's, at Glendale; Dolbeer & Carson, Eureka; Vance's, Eureka; Excelsior Redwood Co., Eureka; Occidental, Eureka; Elk River Mill and Lumber Co., Elk river; Wyman, Murphy & Co., Springsville, E. I. river; Valley Lumber Co., Newburg, and the Pacific Lumber Co., Scotia.

M. F. STANTON, amalgamator of the mill at Tybo, Nevada, was killed last week by being drawn into a settling pan. He was at work as usual, and was trying to adjust a nut on a set screw connected with a settling pan while the latter was revolving. He wore a large glove on his hand which caught in the gearing, and by that he was drawn into the pan and crushed between the arms or flange. The unfortunate man was immediately removed from his horrible position, and as tenderly cared for as circumstances would permit. As there was no physician at the place, Mr. Stanton was put into N. S. Trowbridge's spring wagon to be brought to Eureka, but he died on the road between Summit and Moore's stations at 11 o'clock the same night.

MINE SALARIES IN AUSTRALIA.—It is pretty well understood that the salary of W. H. Patton, who left the Comstock to take charge of the Broker Hill Proprietary Co. (limited) in New South Wales, is \$20,000 a year. It is stated that John Howell, late manager of the Reno reduction works, resigned his position to accept a similar position in Australia at a salary of \$10,000 a year. If the people in the Australian colonies continue to offer such salaries all the mining men on this coast will be looking out for berths over there.

THE people of Plymouth, Amador county, are beginning to think that the closing down of the Empire and Pacific mines, and no resumption of work, is for speculative purposes. The *Sentinel* says: "Many of our citizens doubt whether there has been any fire in the mines but what could have been extinguished at any time if the management had so wished."



## Bacon and Shakespeare in the Plays.

THE GREAT CRYPTOGRAM.—By IGNATIUS DONNELLY, R. S. Peale & Co., N. Y.; J. Dewing Co., S. F.

"Studiando le mie cifre con compasso,  
Rilevò che s'ero presto scitto i terzetti;  
Perche d'el mio sapir si ta gran chiasso,  
E gli ignoranti mi hanno mosso guerra."

Studying my ciphers with the compass,  
I find I shall be soon under the hiss;  
Because of my lore folks make such a rumpus  
That every dull dog is threat'ning unity.

FATHER PROUT.

Our readers may recollect that some months ago (Dec. 24th) we gave an extended criticism on "Bacon and Shakespeare in the Sonnets," a work which issued from the pen of an esteemed resident of this city. The advocates for Bacon's handiwork in the Shakespearean plays are steadily increasing in number and their intelligence is undisputed. None but a purblind critic can refuse to see in Mr. Donnelly's work the indication of what will be, when fully worked out, a secret history of Elizabethan times. The Baconians have not indorced the cypher with unconsidered acceptance; their claims are based on arguments and illustrations which are able and accurately set forth in the first half of Mr. Donnelly's book. Readers of it will be astonished at the accumulating evidence which on page after page will confront them, all pointing to Francis Bacon's authorship. Parallel thoughts, passages, expressions and even errors taken from his essays, letters, general works and common-place book (*Promus*, edited by Mrs. Pott) place the whole question on the highest literary footing—on one which can no longer be scorned, ridiculed or misrepresented.

It is, however, with the "cypher" that it is our purpose more particularly to deal. At a casual glance a Newton would fail to see through it, but if, with such information as Mr. Donnelly chooses to give us, we join a careful study of coincidences in the position of certain words, a conviction that the author of these plays so constructed them that in the Folio of 1623 certain definite numbers would give us certain definite words is beyond the possibility of a doubt.

Mr. Donnelly's attention was attracted by the peculiar numbering of the pages in Folio 1623, more particularly by those of the Histories; by the frequent occurrence of italicized words; by the meaningless bracketing, and more meaningless hyphenation (for instance, amooth—comforts—false). "Errors common to the time," says the unconvincible; "There with a purpose," says Donnelly, and he tells us to turn to page 53 of the Histories. Multiply 53 by 7, and we will find the 371st word is Bacon; 7 is the number of italicized words on page 53, and we read on page 52, opposite.

"And now I will unclasp a secrete booke  
And to your quicke conceiving discontents  
I'll read you matter, deepe and dangerous,  
As full of perill and adventurous spirit  
As to o'er-walk a current, roaring loud  
On the unsteadfast footing of a *Shpeare*."

Page 67, treated in the same manner, gives us St. Albans.

## Found Out.

If we multiply the last page in the 21 scene, i. e., page 76, by 11, the number of bracket words on the first column of page 74 (counting post-horse as two words), and count from the beginning of column 1, page 74, to the 836th word, it is *Found*. If we start from the top of the next page (75), and again count 836 words, we have *Out*. The first rule in counting Mr. Donnelly found to be "Exclude bracket words, and count hyphenated words as one word." (The words spoken by players alone are counted.) Any reasonable person can see very readily that a mode of counting which was to give uniform results could only be arrived at by changing the count by the addition of bracketed and hyphenated words; otherwise we would have but few words from an unvarying counting number, viz., up or down the column counting forward; up or down the column counting backward—just four words.

The bracketed and hyphenated words now come in; and that they are thus intentionally inserted we will see from the following remarkable coincidence. If we multiply page 75 by 12, the number of italicized words on first column of page 74 the result is 900, and counting 900 words including the bracket words and counting hyphenated as double words we again have the word *Found*. That is, going over the same ground, from the same starting point, and attending to brackets and hyphens gives us, with a number which includes them, the same word. Starting again at page 75 and counting 900 in the same manner, i. e., including bracketed words and counting hyphenated words as double, we reach the same word as before, *Out*.

This will help to explain to us what has given the critics some food for cavil, viz., "root numbers" and "modifiers," and we must here recollect that a scent so keen as that of her Majesty, Queen Elizabeth, was necessarily the occasion for great care and complexity in the construction of a cipher; her Royal laughter at Jack Falstaff's "quick wit and great belly" would soon have changed to Royal rage had she thought that *old* and *jade* would, with mathematical precision, unite by 7 different counts, and describe her to future ages as the "old jade."

\*The revelations which Mr. Donnelly makes are more than horse out by Judge Hogmer's interpretation of the Sonnets; a paper on their coincidences is in preparation by us.

Mr. Donnelly's fac simile pages of the plays Henry IV, pt. I and II, are marked on the margin with the number of words in fifties, and every tenth word is underlined in red ink. Bracketed and hyphenated words are also marginally recorded; counting is thus reduced from a tedious to a comfortable and fascinating process. This the public must do for themselves, as Mr. Henry A. Clapp, a noted Shakespearean critic, writes in the *Advertiser*: "It is almost certain that no competent (sic) critic will have the patience to follow it. . . . So that the world shall be able to know whether or not the author's solutions are verified by the first folio text of the first and second parts of Henry IV."

Now, as there are modifying numbers dependent upon words, brackets, and hyphens, there must be a number to modify; as a matter of fact there are several, and as these usually interlock in pairs, we thus see how complex the cipher may become. Mr. Donnelly does not tell us how he obtains these numbers which we are to modify; he calls them root numbers; but, as the reading of the cipher depends upon the paging, we ought to suspect that the root numbers would increase or decrease in a certain ratio dependent upon a certain numbered page, and he themselves modifications of one number. This, Mr. Donnelly hints, is the case, and he fears that some acute mind or minds may find it out and deprive him of some profit by finishing the work before him.

## Modifiers.

Part I, Henry IV concludes on page 73. Part II begins on page 74. There are two columns on each page. From these two pages all the numbers to modify with are obtained. Col. 1, page 73, is broken into three parts and contains 12 modifying numbers. (*Exits*, etc., break a column.) Col. 2 contains 8 modifying numbers. Col. 1, page 74, contains 5; and Col. 2 contains 3 parts and gives 12 modifying numbers, in addition to 7 others when we count in bracketed words and hyphenated words as double.

The number of words in a column, or in part of a column when it is broken, or the sum of two parts, form the modifying numbers, for instance:—"The first subdivision of the second column on page 74 contains 50 words; the second, 168; the third, 30; and the reader will observe hereafter how those figures, 50 and 30, play backward and forward through the cipher story, and he will see how the whole story of Shakespeare's life, as well as Marlowe's, radiates out from that central subdivision, containing 168 words, or 167, exclusive of the first word."

## Root Numbers.

The root numbers for so much of the story as Mr. Donnelly has worked out are 505 and 523; 513 and 516; 506. These are obtained, he informs us, by multiplying certain figures on page 73 by certain other figures on page 74 (we obtained 505 by adding to page 73 the number of words (23), in first subdivision of Col. 2 on same page, and then multiplying the resultant number by 5, the first group of bracketed words on Col. 1, page 74; and hope others will try and do better).

Thomas Davidson remarks that if we add the figures 1, 8, 11, 18 consecutively to 505, it curiously gives all Mr. Donnelly's root numbers. Another critic says 222 is the primal root number. In another play on which we are at work, 444 gives some extraordinary results. Another remarkable number is 888. I quote Mr. Donnelly: "Then I observed that if we multiplied 74 by 12 instead of 10 the result was 888, and if we commenced to count from the top of the first column of page 72, the result was 494, total on first column of page 72. This deducted from 888 leaves 394, which is the very significant word *plays*. Then I said to myself, volume of plays; do the multipliers of 74 alternate? Volume was reached by multiplying 74 by 10, the number of bracket words on the first column of page 74. Here we have 1, 2, 4, 8 mixed up with tens in a manner which considerably alters the series and may assist in fixing a ratio which will disclose the cipher numbers for other plays by modifying their various pagings."

## The Cipher Story.

It is here well to remark that some distance of time separated the production of Parts I and II, Henry IV, and also that the quartos (the first copies) were differently pagged and in many places differently worded from the folio of 1623. Bacon thus held the key in his own hand to save himself from being "hanged like a dog for the play of King Richard the Second," as he graphically expresses it in the cipher story; and Richard II was the first play which bore the name of Shakespeare.

The wildest critical shaft has been aimed at the impossibility of Bacon's knowing of the Hayward incident "before it occurred." Hayward was arrested in 1599; his confession is to be found in the State Paper Office. The second part of Henry IV appeared in 1600 or one year later, and it is in this part that we find the cipher story of Queen Elizabeth's beating Hayward. The paging of the folio 1623 alone reveals it. The quarto 1598 could by no manner of means be dragged into question by a careful critic, for was not the cipher already prepared? Was not the first part of Henry IV already published? And the story, when ready for telling, would it not naturally take its place in the next play?

The story radiates forward from the beginning of part II, backward from the end of part I. Space permits us to give but a short example of the regularity which will be found to

pervade many of the calculations. Five hundred and five, the root number, less 30 the modifier gives us 475; now counting upward from the beginning of the second subdivision of the first column of page 75, we find that there are 193 words, and counting downward there are 254 words. Let us take these alternately from 475 and they will give us the words on the following column (i. e., the 475th word from the starting point) according as we count up or down, counting brackets and hyphens (b and h) which are 15 in number, twice. Mr. Donnelly's system of notation is as follows:

Page and Word Cnt.	Page and Word Cnt.
505-30-475-193-282-15 b & h-267 up col + h-245 75.2 our	21 75.2 men
315-30-475-254-221...down column....	21 75.2 had
515-30-475-193-282-15 b & h-267 up col + h-245 75.2 had	28 75.2 and
515-30-475-254-221...down column....	23 75.2 the
505-30-475-193-282-15 b & h-267 up col + h-245 75.2 had	29 75.2 backs
505-30-475-193-282-15 b & h-267 up col + h-245 75.2 had	29 75.2 and

The word *their* is an example of another variation in the counting which may go backward from the end of the same scene. We have it here going backward from the end of scene 21, page 76; 49 is the number of words from the end of the scene to the bottom of the column. It must therefore be taken from 475, for the same reason that we took the numbers 193 and 254.

## Anne Hathaway.

The following is a description of Sweet Ann Hathaway from the cypher text. "She hath a pretty face and a fair complexion, with a high color and long red hair. She was a gross and vulgar woman, with a good heart, 'tis true, but a loud tongue and rough manners—a gossip with a giddy head, the model from which I draw Mistress Quickley." There are many instances, such as the following: The cipher narrative required a certain word, w'd, Bacon put it in the text, but *owned* is the word required for the making of sense in the play, and modern editions so have it. The names of Bacon's Uncle Burleigh and his cousin Cecil dare not, of course, appear in the plays. The uncle, therefore, is burly; and the cousin is seas-ill, a compound of two words; says-ill, or seas-ill. With regard to the description of Anne Hathaway, Mr. Donnelly says: "This is the only time *red* appears in this act, and it is found but twice besides in this play. And this is the only time *color* occurs in this act, and this is the only time *complexion* appears in this play, and it is found but four other times in the ten historical plays. And it is dragged in here by the heels. 'It discolors the complexion of my greatness,' says Prince Hal, 'to acknowledge that I am weary I and note how it is matched with fair.'" We verified the count and found both words in the same column; the same count giving them from the root number 505. We hope that those who have had the patience to follow us thus far will obtain the book and have the hardihood to judge of it for themselves. Mr. Donnelly pathetically and fairly says: "I am sorry to see that some persons seem to think that this whole question merely concerns myself, and that it is to be answered by sneers and personal abuse. I am the least part, the most insignificant part, of this whole matter. The question really is this: Is the voice of Francis Bacon again speaking in the world? Has the tongue which has been stilled for 260 years again been loosened, and is it about to fill the astonished globe with eloquence and melody?"

This has the true ring; it is an honest appeal to the judgment of his readers. The following is from the pen of the late Richard Grant White, who passed the bounds of fairness or justice in his unceremonious condemnation of Mrs. Pott's edition of the *Promus*: "The biographers of Shakespeare must record these facts, because the literary antiquaries have unearthed and brought them forward as new particulars of the life of Shakespeare. We hunger and we receive these husks; we open our mouths for food, and we break our teeth against these stones." Truly the man Bacon is slowly but surely replacing the myth Shakespeare of whom we read in the cipher narrative: "For I have sometimes seen him in his youth caper it about with a light heart, hallooing and singing by the hour and in the raggedest apparel and almost naked. A bold, forward rogue full of his own most beastly desires. A glutton rather overgreedy than choice, with his quick wit and his big belly weighing 200 pounds. He is extraordinarily fond of the bottle, but I must confess there was some humor in the villain; he hath a quick wit and a great belly, and indeed I made use of him with the assistance of my brother as the original model from which we draw the characters of Sir John Falstaff and Sir Toby. To see him caper with his great belly! It draws together to the playhouse yards such great mutters of people far beyond my hopes and expectations, that they took in at least 20,000 marks. It pleases Her Majesty much more than anything else in these plays. It seems indeed to grow in regard every day. It supplies my present needs for some little time. He was wise enough to save his groats and buy an estate of lordship. I heard that my lord, the German Minister, told Sayall that it was well worth coming all the long way to England to see this part of Sir John alone, in this play, and the Merry Wives of Windsor."

## Careless Critics.

To show how lamentably ignorant critics have proved themselves in even the simplest rule of counting, we adduce the following instance which any child of ten years can verify.

Mr. Donnelly says: "There are 447 words on the first column; if, now, he deducts ten from 447, the result is 437, but this is really not the tenth word counting from the bottom of the column; it is the *eleventh*." Mr. Clapp ridicules this sentence and compares it to Lord Duquerry's count of fingers—10, 9, 8, 7, 6 and 5 are 11. Let the reader take any short sentence at the bottom of a column; count the words (suppose there are 15), and if he does not find that the tenth word counting forward is the *sixth* counting backward, he will prove as blind as the critics who won't see. The 437th word is therefore the tenth + 1 = 11th from the bottom, when there are 447 words in the column.

## Arranging of Words.

"The words when found are arranged according to a certain rule." This rule Mr. Donnelly has not explained, and if he has perfected it he should have told us more about it. His greatest object, he says, is to show that there is a cipher in the plays; his other object appears to be the keeping, as much as possible, of the secret to himself; he has, strange to say, perfectly succeeded in both instances. Our endeavor has been to arrive at a fair estimate of his labors so far as he has submitted them to the public.

Four weeks of careful investigation have convinced us that Mr. Donnelly deserves much credit for accuracy in the literary portion of his work, and we here take the opportunity of thanking Mr. Deering of the Law Library for photocopies of the early quartos, and for a complete set of Bacon's works, Mr. Horace Wilson for the unretouched use of Staunton's photocopy of folio 1623, and Mr. Whittaker for a very complete set of books and pamphlets on the Bacon Shakespeare controversy.

The discovery of Bacon's authorship will be incalculably useful in clearing up many of the difficulties which are connected with the history of the doubtful plays. Beaumont did much dramatic writing. Who has not heard of "Beaumont and Fletcher," yet Beaumont lived to be only nineteen. Bacon was 20 when he entered Gray's Inn in the year 1580. The German critics have always maintained that there must have been *progressive stages* in the growth of Shakespeare's genius; the dates and facts connected with Bacon's life in great measure help us to solve the difficulty and point unerringly to the real Shakespeare.

*Errata*.—We take the opportunity of calling the attention of the readers of Mr. Donnelly's book to the following slight mistakes of the printer. They are easily corrected. Page 565, par. 3, line 4, for 81 read 86. *Facsimile* Henry IV, v. 75. col. 1, line 3, and col. 2, line 252, one hyphen has been omitted on the margin; page 78, col. 2, line 7, the word (almost) which is bracketed within brackets, counts as a word, this puts the red underline back 1 word under the 3, and makes no. of words in col. = 462. Page 699, line 30, read 10b = 2. Page 601. Diagram:—I goes up the 1st col. 2 goes down the 1st col. (making the dotted line like the letter S). Broken type:—*facsimile*, p. 76, col. 2, word 300—to.

Mr. Donnelly's labor has been very great, and we mention these errata in the spirit which leads Mr. Donnelly to say, "Help me to perfect it, rather than meet me as I have been met by insults and denunciations." We have read the work closely without finding any inaccuracies; more labor will make the counts appear more symmetrical.

WILLIAM GREGORY HODSON.

June 1, 1888.

**WARPING OF WOOD.**—It is said that the wood on the north side of a tree will not warp as much as that from the south side, and that if trees are sawn in planes that run east and west, as the tree stood, it will warp less than if cut in the opposite direction. However this may be, it is certain that the tendency to warp when sawn into boards is much greater in green than in dry wood, and that the convex side of the curve is always toward the heart. This warping, due to unequal shrinkage, and to the more open texture of the external portion of the tree, is not found to occur in the middle plank or board of the log, excepting as it may, in slight degree, reduce the breadth. This quality of not warping, which is in many cases absolutely indispensable for certain uses, as, for example, in the sounding boards of pianos, is secured in the case of spruce timber by first quartering the logs, and then sawing them with the angle downward. It is then sawed into boards very nearly at right angles with the line of annual growth, and a small triangular strip must be taken off to make the board square edged, but qualities of stability and strength are secured that could not otherwise be had.—*Mechanical and Milling News*.

ANOTHER survey is soon to be made by the Southern Pacific Company north from Los Angeles, it being the intention of the company to build a road which will be less expensive to operate than the present main line. The new line will leave the main track at a point about a mile south of the San Fernando tunnel, and will follow very closely the old emigrant wagon road through the Santa Susana range. The passes through these mountains will be effected at the Canyon de Laclis, and the road will run through the mineral land district and out into the Santa Clara valley. The object of this route is to avoid the San Fernando tunnel and loop on Mount Tehachapi.

THE backward spring has shown a marked effect on Alaska mining matters. Very little work has been done thus far this season.

THE International Congress of Anthropology, the first ever held in America, began its session at Columbia college this week.





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SAN FRANCISCO

Saturday Morning, June 16, 1888.

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## Passing Events.

The discoveries in the Pajareto mountains, ten miles west of Nogales, A. T., are attracting considerable attention. Pack trains are commencing to bring in rich silver ore. A large area of country in the vicinity of the discovery has been located, and there are many prospectors and miners at work.

The men working in the coal mines and at the coke ovens at Wilkeson, Washington Territory, are having trouble. The mine and coke ovens have been shut down since the 1st inst. There is also labor trouble at the Roslyn mines in Kittitas county, on the line of the Northern Pacific.

The project to build a gigantic smelter at Tacoma has fallen through. The capitalist who was going to do the work has not the capital it was supposed he had.

The black sand region at Yakutat, Alaska has not panned out as rich as expected. The whole thing was a "sell," and a lot of disgusted miners have returned to Juneau. The black sand, worth at least \$40 to the ton, did not have 40 cents.

In mileage of new track laid this year, California takes the lead, 279 miles of railroad track having been added on 29 different lines in this State.

**THE LICK OBSERVATORY.**—We are unavoidably compelled to defer the Lick Observatory edition of the PRESS, which it was our intention to publish this week. It is our expectation to publish the description of the observatory in the PRESS of June 23d.

## After Many Years.

It is now just 30 years since vsin mining began first to be practiced in the State of Nevada, this industry having been preceded there, as in most of the Pacific States and Territories by an era of placer mining extending over a period of eight or ten years. While every section of the State has during these 30 years been explored and prospected in a hasty and superficial way, very little of it has been subjected to a close and careful examination, such as appears now to be going on in many parts of it.

That so little thorough work was done in the early day was due to the fact that the prospectors of that period being all in search of Comstock lodes, were not disposed to throw away their labor on such ordinary deposits as were constantly being encountered in the course of their explorations. Impelled by this purpose they hurried on from one mountain range to another, the whole country having in this precipitate manner been gotten over in an incredibly short time. Mining districts were laid out and organized by the scores, and claims taken up by the thousand, a very large percentage of the whole having afterward been practically abandoned.

The extent to which this business of locating claims was carried by these eager and rushing avant couriers is denoted by the proportions it reached in Western Nevada, more especially in the regions adjacent to the Comstock lode. Thus, there had been, prior to 1882, taken up and recorded in the Virginia district 3305, and in the Gold Hill district 7364 mining claims; this being aside from a good many claims located but never recorded. While these locations were for a given area much more numerous in the neighborhood of the Comstock lode than elsewhere in Nevada, still, when we come to extend the record over the whole State their entire number must have reached 25,000 or 30,000, and possibly a much higher figure. When it is considered that of these claims hardly more than one in a hundred has since been developed into a paying or even into a prospectively valuable property, the unsubstantial nature of this early prospecting business becomes amply apparent.

Clearly these pioneer prospectors performed their task with a haste little calculated to determine the mineral resources of the regions traversed by them. Surveying through the mountains without finding what they were in search of, the most of these adventurers left the country, some going to Utah, Idaho, Colorado or Montana, but more returning to California, whence they came.

This experience had in Nevada has hardly been paralleled in any other of these interior countries. As the pioneers in silver mining her people had everything to learn, and they had to learn it, too, under the most unfavorable conditions. They were not only novices in the business, but they suffered also from an absence of almost every facility for its successful prosecution.

During the period this new industry was being developed in Nevada the most of her neighbors were in bonanza working their placer mines, Idaho, Montana, Utah, Arizona and Colorado being all so engaged. About the time their placers were exhausted, the inhabitants of these countries, being ready to embark in silver mining, had all the knowledge and experience gained in Nevada to begin with, and if they have since been able to avoid some of the mistakes elsewhere committed, this may justly be attributed in part, at least, to the lessons taught them by their predecessors in the Sagebrush State.

While it is true that most of the early work in Nevada was done in the hasty and imperfect manner described, that performed in a few localities was of a more thorough and determined kind, yet hardly ever enough so to bring to light large and valuable bodies of ore or settle the question as to their probable existence. This was a work left for later times—for the men of to-day, who, crossing the tawny deserts, are once more invading the lonely and half-deserted mountains, disturbing their silence with the many sounds familiar in the active mining camp. All over the State, even in its remotest corners, this work of rehabilitation is going on—not very vigorously yet, except in a few districts, chiefly those lying along or adjacent to the railroads. Still there has been infused into many others enough of this new life to show

that a more general interest is being awakened in mining over there. That any sudden or very sharp revival of the business will occur is not anticipated. All that is promised or can reasonably be hoped for just now is the performance of such patient and more effective preliminary work as will serve to make patent the hidden wealth of the State and thus secure the capital required for rendering it practically available.

That Nevada abounds with mineral resources of almost every kind seems probable, her great stores of precious metals being established beyond question. Having by certain adventitious circumstances and events been forced to the rear, she has during all these years been kept there, even the fame of the Comstock having been insufficient to bring her to the front. Other mineral regions, in some respects more eligibly situated, have been liberally aided by capital while Nevada has so been neglected, this State in some minor particulars suffering by comparison with most of her neighbors. In none of these is the timber supply so limited as in Nevada, nor are any, with the exception of Utah and Arizona, so badly off for water.

So far as lumber is concerned, however, that, when railroads come to be multiplied and extended as they will be, can at moderate cost be obtained from the heavily wooded Sierra on the west, while the water supply can be greatly increased through the construction of reservoirs and recourses to artesian boring. In no event can a scarcity of either timber or water become an insuperable or even very formidable obstacle to the progress of mining in Nevada, while there is reason to believe that the era of more active exploration now likely to be inaugurated will ultimately, and perhaps very soon, settle the problem of her great mineral richness in the affirmative.

## Bi-metallism in England.

As is well known, gold has in great Britain for more than three-quarters of a century been the standard money of the realm. After holding such position for so long a time, it is not to be expected that a people so wedded to custom and so averse to change as are the English, will readily consent to see this metal displaced by or partially share its money function with silver.

That this will, however, be brought about in a very short time seems now highly probable. Concerned at the falling off in trade and the dullness in manufacturing and other branches of business, a Royal Commissioner was some time since appointed by the Government to inquire into the causes of such general decline and stagnation in these industries and interests. This Commissioner, among other things, found the monometallic standard to which England had so long adhered, to be one of the factors in producing the wide spread depression complained of.

This report led to the appointment a special Commission, charged with the duty of ascertaining to what extent the demonitization of silver had been instrumental in causing this untoward condition of affairs. This Commission, though it has for some months past been prosecuting its inquiries, has not yet made public its conclusions, if any have been reached.

Meantime, such has been the interest felt in the solution of this question that Bi-metallic Leagues have been formed in most of the larger cities and manufacturing districts of Great Britain; these leagues, comprising among their members a goodly percentage of the more prominent bankers, merchants, businessmen and manufacturers of the Kingdom, including also many heavy capitalists and members of Parliament. Holding frequent meetings and taking other effective means for the promulgation of their views, these organizations have succeeded in obtaining for them wide publicity, that endorsement by the commercial and manufacturing public having surpassed all expectation.

These leagues are now working to bring about an agreement between England, the United States, Germany and France for the restoration of the double standard. This effected, it is expected that all the other civilized nations of the world will readily adopt the same. This is by far the most widespread and influential movement yet made either in England or elsewhere, on behalf of the rehabilitation of silver, and may be hailed by the friends of the white metal as presaging an early and decided triumph for their cause.

## The Mining and Scientific Press.

Correspondence is received from all parts of the coast. This is specially useful to our readers, as the writers are generally practical men at work in mine, mill or shop, and their views are valuable. Through them we get at the condition of the various camps, and such news as does not elsewhere find its way into print.

The illustrations given weekly in our pages are mainly of new devices connected with mining metallurgy and mechanics. The numerous appliances invented from time to time are illustrated and described, with a view to keeping readers posted on all practical improvements.

The two pages, in solid fine type, of "mining summary," published every week in the MINING AND SCIENTIFIC PRESS, furnishes a current history of mining on this coast in a condensed, but comprehensive form. This is compiled with great care from a large number of publications printed in the various mining camps. It is arranged by State, county and district in such a form as to be readily examined by parties interested in any particular locality.

Every week is given a complete list of the United States patents granted for the week to Pacific Coast inventors. In addition we publish brief descriptions of such inventions as are of an interesting nature, and such as will be found useful to our Western localities.

The "Mining Shareholders' Directory" has a list of the meetings, dividends, and assessments of mining companies, with amounts, dates, names of officers, etc. Tables showing the prices of mining stocks, and highest and lowest values for the week are also given. The local markets and the New York metal markets are also published.

In the departments of "Mechanical Progress" and "Scientific Progress" it is aimed to present in condensed form such subject-matter as is appropriate to the titles. The "Good Health" column contains such hints and suggestions as are useful to people living in the mining camps, where such matters are not as generally attended to as they should be. The "Engineering" department deals with practical affairs applicable to this coast. The miscellany is carefully collected and gives information concerning new mining regions, the state of affairs and progress in old ones, and such general news as will interest miners. The PRESS also keeps track of what is going on at the local foundries and machine-shops, and the character of the work being done. All that is of general interest going on in our local scientific societies is recorded from time to time. The PRESS should be kept on file at every mine and in every mill, laboratory, library and workshop. It is the oldest mining paper in the United States, and the only one on this coast entirely devoted to mining and scientific matters.

## The Geological Survey of California.

The report on the work of the U. S. Geological Survey parties on the quicksilver mines of this State was completed in 1888 and the report is now being printed at Washington. It is expected that the publication will be issued in a short time.

For two years past the survey parties have been in the field working up the gold belt of California. A topographical party has been sent out from Washington each year for the last three years, and they have finished contour maps on a scale of two miles to the inch of a tract of territory reaching from Plumas to Amador county. As these maps are finished they are taken up by Mr. H. W. Turner and Waldemar Lindgren. These gentlemen have also been at work for three years making complete geological maps, special attention having been paid to the quartz mines.

This geological map is preparatory to a detailed investigation in all the quartz mines. The parties this year have been out since the 15th of March, and expect to be on the field until late in the fall. Mr. Lindgren is at work this season around Forest Hill and the Georgetown divide, and Mr. Turner is working in Tuolumne county. The maps will be published in sheets, each comprising half a degree of latitude by half a degree of longitude.

**TO TEST SPEED.**—The Harbor Commissioners are having prepared 12 piles of extraordinary length, to be placed in Mission Bay as mile-posts, so that the speed of vessels can be tested.



## Steam Schooners.

It is only within the past few years that auxiliary steam power has been given to the vessels engaged in the coasting trade in this part of the Pacific. Ever since lumber mills were first built in California, Oregon and Washington, the trade between the lumber ports and San Francisco has been carried on by the large fleet of sailing schooners. These schooners are built here, and are as fine types of their class as may be found in the world. They are made to carry very heavy cargoes (a large part of which is placed on deck) and intended to stand rough weather. The winds along the California coast are strong and the seas heavy during the summer months, and in winter there is apt to be a heavy gale now and then. For these reasons the schooners have to be built very strong and exceptionally sea-worthy, more especially as they are expected to carry such immense deck loads.

Within the past few years the lumber trade has increased very largely, a result due to the rapid settling up of the southern part of the State and the increase of population. The demand for lumber has exceeded the supply until quite recently. There was great haste to get cargoes, and vessels were scarce. The first

tion on this page. The vessels have broad beam and rather a flat floor, the dead-rise being inconsiderable. Most of the steam schooners are without bowsprits, but have plenty of sail to be handled with in case the machinery is out of order.

The coasting trade of late has fallen largely into the hands of this type of craft. For long coasting trips from Humboldt and Mendocino to San Pedro and San Diego these steam schooners are especially useful, for they get through the "calm straits" readily and are not delayed seriously by strong head-winds.

The engines used are compound, some of them triplex and even quadruple. The boilers are very heavy and made of steel. Though the coasting lumber trade has fallen off within the past month or so, it is only proportionate with relation to its extent for the past year or two. A number of new steam schooners are now on the stocks and the Fulton Iron Works have on hand several engines for these vessels.

## "Figures Won't Lie."

It is the fellows who use them that do the lying, as witness what M. de Varigny, a French statistician, has to say about the fortunes possessed by certain American millionaires, as

directory. An individual constituted like this Monsieur de Varigny ought to prove to the tax-payer of moderate means an acceptable person to perform the functions of county assessor, owing to his disposition to magnify the wealth of the rich.

## Hydraulic Pump for Gravel Mining.

John H. Martin of Oroville, Butte county, has just received through the MINING AND SCIENTIFIC PRESS a patent for an invention which relates, broadly, to hydraulic gravel mining, and particularly to a pump by which an excavation can be readily made in the sink or workings down to bedrock, preparatory to applying this ordinary hydraulic elevator. This pump is also adapted for use in river gravel mining, acting itself as an elevator. A half-interest in the invention has been assigned to Joshua Hendy of this city.

An elevator of the ordinary type, such as was patented by the same inventor in May, 1883, consists of a discharge pipe, the lower end of which is set down into an excavation in the workings, and the upper end is in communication with the flume or rests on the foot dam or top of the breast above. In the open lower end of this pipe is fitted the nozzle of the supply pipe

the supply pipe, and as the excavation caused by the operation of the gravel and the disposal of the material by the pump goes on, the discharge pipe automatically varies its inclination, its lower end sinking down, the joint at the nozzle permitting it, and the supply pipe itself being jointed, its sections change their inclination as the gravel washes out the stuff under and around them, so that the whole apparatus goes down as the excavation proceeds, and at the same time the material of said excavation is forced upwardly and carried away by the pump.

It will be seen therefore that the excavation is thus made of the necessary depth down to the bedrock without the ordinary digging and ordinary disposal of material. It is obvious that this pump may be considered an elevator itself, and may be used as such in river bottoms and other places, or may be used only for the purpose of pumping water out of the sink.

## Black Sand Mining.

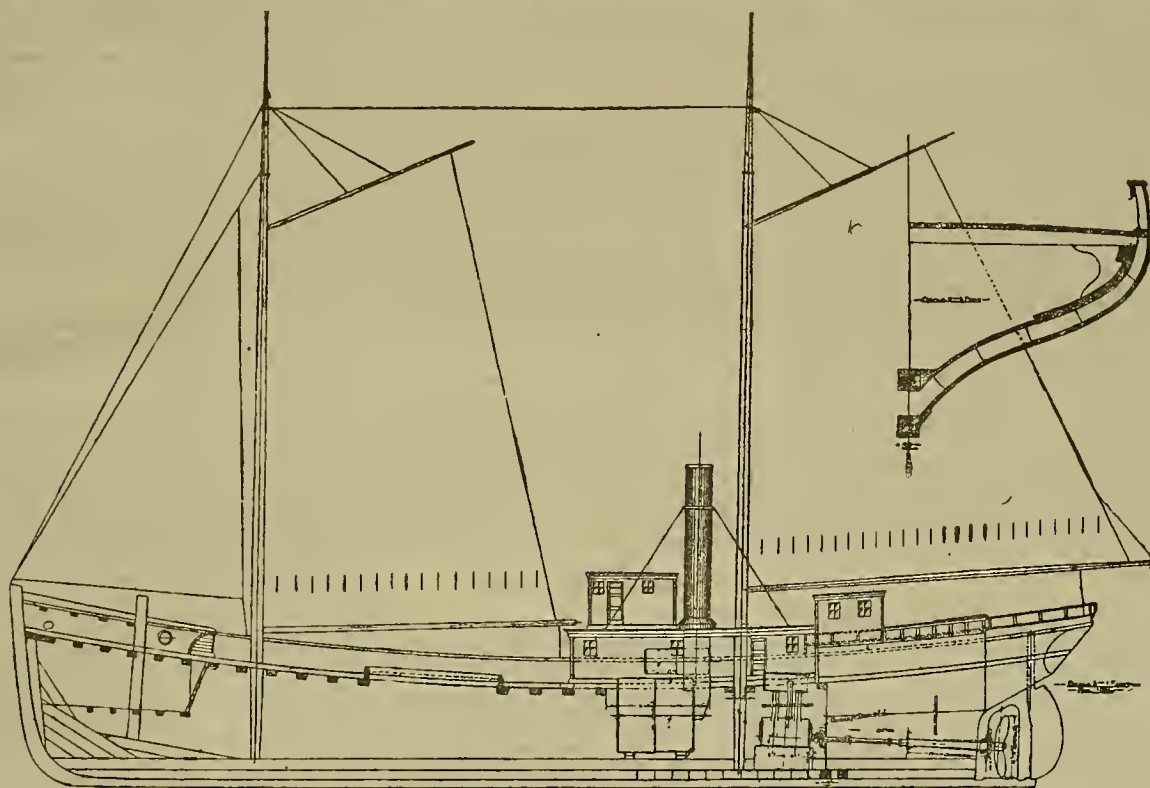
It cannot be said that "black sand mining" on our ocean beaches has been by any means as successful as was expected of it. In the early days, when the Gold Bluff deposits in the northern coast of this State was first found, considerable gold was gleaned, it then being concentrated on the beach. But after the first rush there no very successful results were accomplished. All sorts of plans were tried to save the gold in the sands, but it is so very fine that it is difficult to save.

The deposits further inland were worked but no fortunes were made. There is so little difference in the specific gravity of the gold and the heavy sands that the ordinary appliances of gold mining are not effective. Every now and then we hear of a local excitement on this subject, somewhere along the coast, and some one is going to mine on a large scale; but a few months' work puts a stop to it. The big deposits on the Northern coast were to be worked on a large scale by a heavy company a year or so since, but the report of a skilled expert put a stop to the investment.

The Yakutat country, in Alaska, is the scene of the latest black-sand excitement. Lieut. Schwatka, while there in 1886, examined the deposits, and one of the party, Prof. Wm. Libby, carried a quantity of the sand East with him. Tests, however, showed there was not enough gold to pay. The cook of the Schwatka party, however, afterwards claimed to have found richer deposits, and confiding his secret (?) to others, a prospecting party was made up and went up there. They found sand worth \$4 to \$5 per ton. Then two of these men exhibited sand which, on assay, went from \$40 to \$60 per ton. This, of course, created an excitement, and a party started last January for the field, and after a very hard trip reached the place indicated. The Alaska Mining Record tells their story: "About 30 miles inland from Dry Bay they found some gravel and black sand, which they prospected quite thoroughly, but found nothing that would justify working. All the sand and gravel in that section contains a very limited quantity of gold, which will not yield to exceed 50 cents a day to the man. On the 17th of March they arrived at Dry Bay, at which place they employed some Indians, and started up the beach heading for Yakutat, where they arrived on the 24th. During the trip up the beach they came in contact with considerable quantities of black sand, which they prospected, but it failed to reveal anything except a few fine colors. After arriving at Yakutat they prospected the celebrated black sand island, over which all the excitement was created concerning that section, and found practically nothing. The party was justly indignant at those who circulated the reports of the fabulous mineral deposits said to exist on this island, and no terms of censure were too strong to be applied to them."

Another man who visited this deposit gave it a practical test, and says they cannot get over two cents a ton. This ends the last black sand excitement.

On the 12th inst. an injunction was granted in the Superior Court of Butte county by Judge Keyser, closing down a number of mines on Butte creek. This stream flows from the hills about five miles east of Chico. The suit against the miners was brought by farmers on the lower part of the stream.



TYPE OF STEAM SCHOONER USED IN THE PACIFIC COASTING TRADE.

schooners which had engines put into them as auxiliary were very successful in making quick trips and making money, and as a result a large number of the coasting vessels built of late have been given steam-power.

The prevailing winds are down the coast, and vessels going up in ballast from this or southern ports have to beat against strong winds. With steam, however, they make better and more certain passages, steaming directly up along the coast to their destination. Coming back with cargoes they can use their sails alone, or use both steam and sail combined. When at the "chute landings" along the coast, at the mills, where there is little protection, the steam-power enables them to get away at short notice and to make their landings with more certainty and safety.

We give on this page an engraving showing the type of steam schooner now being built. The Fulton Iron Works of this city have made a specialty of marine engines for this class of vessel, and we have described several of their engines in recent numbers of the PRESS. It will be seen from the design that the machinery is kept as compact as possible, so that no more space than necessary will be taken up. The deck-houses, too, are carefully designed to give as much cargo space on deck as may be. The fore-castle is forward in the usual place. Some of the vessels are now built with two tiers of deck-houses, so as to give room to carry passengers when necessary.

The form of hull is shown in the midship sec-

tion on this page. The vessels have broad beam and rather a flat floor, the dead-rise being inconsiderable. Most of the steam schooners are without bowsprits, but have plenty of sail to be handled with in case the machinery is out of order.

The coasting trade of late has fallen largely into the hands of this type of craft. For long coasting trips from Humboldt and Mendocino to San Pedro and San Diego these steam schooners are especially useful, for they get through the "calm straits" readily and are not delayed seriously by strong head-winds.

The engines used are compound, some of them triplex and even quadruple. The boilers are very heavy and made of steel. Though the coasting lumber trade has fallen off within the past month or so, it is only proportionate with relation to its extent for the past year or two. A number of new steam schooners are now on the stocks and the Fulton Iron Works have on hand several engines for these vessels.

Measured by his deserts, John P. Jones ought to be worth the large sum stated, but doubtless the worthy Senator from Nevada would gladly share with his Galician friend all that the latter could show him to be honestly worth over a couple of millions or such a matter. If a hundred millions may be set down to John Jones, presumably John Smith should be credited with a like amount, or, say for all the John Smiths in the State, the trifle of 20 billions or thereabouts.

The man possessed of not more than a beggarly million, would, we may suppose, be regarded by citizen Varigny so despicably poor that he would hardly look for his name in the city

by which the water under pressure is directed into the inclined discharge pipe, the water serving to force the material up through the discharge pipe, this material being first washed down into the excavation by means of the hydraulic giant throwing a heavy stream on the surrounding workings. In ordinary cases, the excavation for the elevator must be dug in the usual manner, and throwing up and disposing of the material and water which accumulate, by shovels, wheelbarrows and ordinary pumps.

This new invention has for its object the provision of a pump which is so constructed as to make and clear its own excavation, and which can also be used in river-mining, as it will raise the water and gravel high enough to run through flumes and gold-saving devices. The invention consists essentially in a discharge pipe to be set at an inclination with its lower end in the workings, a nozzle so jointed to the lower open end of the discharge pipe as to permit said pipe to change its inclination, and a sectional supply pipe with movable or flexible joints connected with the nozzle and supplying water under pressure.

In operating this pump, it is properly set in the first place. A gravel of ordinary kind is then used to disintegrate the material in the workings directly under and around the lower end of the discharge pipe. This material finds its way into the open lower end of the discharge pipe, and is thence forced on up by the water under pressure directed by the nozzle of



## MECHANICAL PROGRESS.

## Viscosity Determination of Lubricants.

A paper of considerable interest was read at the recent May meeting of the American Society of Mechanical Engineers, on "The Mechanical Significance of Viscosity Determination of Lubricants." Several forms of instruments—"viscosimeters"—for determining this property, were described, one of which has recently been designed for the use of the Standard Oil Co. This instrument consisted of a bath of water, in which is held a vessel capable of holding four ounces of oil. The lower end of this vessel has an outlet about one-sixteenth inch in diameter, so adjusted as to be completely surrounded by the water-bath as possible. A small piece of glass is set into the lower part of the oil vessel, and the water-bath is of glass, so that as the level of oil falls it finally comes into view, and the time of the flow of the oil can be made to determine at the instant when the oil reaches a line drawn at a particular point on the glass portion of the oil vessel. The temperature of the water-bath is adjusted by condensing steam in it. The oil vessel is filled to a desired point, and the time is noted which allows the oil to drop to the mark previously mentioned.

In testing oils, the interval in seconds, which is the degree of viscosity which the oil possesses, is recorded.

Another form of viscosimeter consisted of a cylindrical vessel in a proper heating bath, fitted with a piston. The vessel being filled with oil, the piston is drawn up until an eye in its rod is above the upper of two cross wires. The bath being at the proper temperature, the piston is released and begins to sink. When the eye passes the upper wire time is noted with a stop-watch, and the latter is stopped as the eye passes the lower wire. This interval of time is taken as the measure of viscosity. Both the cylinder and the piston are of glass. The piston is about 2-1000 inch less in diameter than the cylinder. The cylinder is made with all the accuracy of bore that the highest optical talent can afford. This apparatus is so sensitive in its action that the viscosity of illuminating oils can be distinguished by its use. Its designer, Mr. C. M. Perkins of the Atlantic refinery, Philadelphia, has successfully applied the instrument to the explanation of the difference of illuminating effect of various kindred petroleum products which it is impossible to investigate with viscosimeters of the jet type on account of their far less sensitiveness.

Mr. J. E. Denton, who read the paper, then submitted a table showing comparative results for given oils obtained by the use of the different viscosimeters. From these figures Mr. Denton concluded that the possible saving in the oil consumption necessary for minimum wearing away of the rubbing surfaces, due to the difference in viscosity, proves that the most economical lubricant is the oil of the greatest viscosity which will permit the oil to be fed, wherever the loss of power in friction is an element of inferior importance, as is the case in all heavy machinery.

## Welding Soft Steel.

Mr. Wailes states, before the British Iron and Steel Institute, that, in his experience, the very soft and pure basic open-hearth steel does not need the excessive mechanical compression that ordinary steel does, and consequently smaller and less-expensive blooming-mills will be required to break it down; and as the steel has remarkably good welding capacity, the writer can readily see how this may be true. The writer has lately been squarely controverted in his statement that soft steel may be easily and safely welded, in a paper before the American Society of Civil Engineers by Mr. William Metcalf, and he therefore wishes to be very conservative and cautious in the face of the judgment and experience of such an eminent engineer.

However, he feels it but just to the facts in the case to say that soft basic open-hearth steel sticks together with a great deal of tenacity when properly hammered together at a comparatively high heat, and the forging kept up until the metal has been considerably reduced in temperature, in a manner which very much resembles welds, and the metal, when pulled or otherwise broken apart, does not lack in ductility or show fiery crystals. It has been claimed before the British Iron and Steel Institute that soft basic steel can be easily fattigotted, bloomed and welded into scrap bars, which are sound and possess all the qualities of that original steel, and President Adamson, in his annual address, in May, 1887, said that he personally had a considerable record of the free welding properties of mild steel, and that at his works they were doing it successfully every day, and that he had found the steel must answer the following requirements: "That the carbon must be low, the manganese four times as much as the carbon, and that the silicon, phosphorus and sulphur combined must not exceed one-tenth of one per cent."—*American Machinist*.

NEW APPARATUS FOR TRANSMITTING FORCE.—A French engineering professor, M. Raymond Snyers of the Luvain University, has invented an apparatus for transmitting force between bodies moving at greatly varying velocities

without accompanying disadvantage of a violent collision. The method consists in furnishing the contact surface with steel brushes, which, by the entanglement of their "bristles," are enabled to grip one another. In this way the swiftest motion may be imparted gradually to a perfectly stationary body and a maximum of shock can be arranged which can never be exceeded, be the impelling force and velocity what they may. The inventor has in view chiefly the requirements of quickly moving lifts, railway trains and other bodies moving at high speed and with great momentum; and if it be possible to produce in this way an effective brake, or to obtain an automatic working of railway signals, much will be done to minimize some of the most serious perils which at present threaten life and limb to industrious occupations.—*Chicago News*.

## The Choice of an Engine.

Any type of steam engine can be employed in the arts and manufactures. The choice between them is therefore to be determined by circumstances; the motion which is to be transmitted, the work to be done, the fuel to be used, the arrangements of the shops, the resources of the owner, etc. If delicate machinery is to be driven, such as spinning-machines, instrument-making machines or electric apparatus, the engine should be run very evenly and be provided with every appliance for the maintenance of regular circular motion. But if the engine is to be used for hoisting or work of a kindred nature, it must possess a reversing gear also, so that it may be run in either direction.

Again, if an engine is used only as a motor for rough work, it will need none of the delicacy of adjustment that the first one called for; it now needs only to be simple, solid and easily handled, and it must not be liable to be injured in its own action by dust or shocks to which it will be subjected. In localities where fuel is dear and water abundant, a condenser should be used and the engine worked with as great a degree of expansion as possible; the heating surfaces and the grate should be large. On the other hand, where water is scarce and fuel is cheap, a high-pressure engine should be taken, the condensers dispensed with and the boilers provided with the best of steam-generating appliances. In this case the engine should be horizontal, with a heavy frame, well built foundation, and acting upon a shaft as near the ground as convenient; but if space must be economized, a vertical engine may be used, though it will be necessary to have all parts of extra weight. It would be possible to go on multiplying cases almost indefinitely, all of which would only serve to show that there is no absolute rule by which the best type of engine is established, and that, however excellent service any particular system might render in a given case, the results in another case might be poor.—*Power*.

AMERICAN vs. ENGLISH LOCOMOTIVES.—Much has been said of late, in both English and American journals, in regard to the comparative merits of American and English locomotives. This discussion has lately been taken up with considerable spirit between our English cotemporary, *Engineering*, and several Canadian and English engineers. In Canada, some of the locomotives are imported from England, and many from the United States, consequently Canadian engineers have excellent opportunities of judging of the comparative merits of the machines from actual experience with both under the same conditions. The natural result is that they favor the American design, and the amusing feature of the discussion comes in from the fact that the Englishmen, knowing almost nothing about the American engines, and constantly revealing that fact in their communications, yet persist in their efforts to convince their colonial compatriots that the American locomotive is all wrong, and that the mother country is the only proper place to look for locomotives—efforts which seem to result in absolute failure.

EXACT WORKING.—The day has passed by when a variation of a sixteenth of an inch is allowed in interchangeable work, even where as much variation would do no harm. If the gate is left open a little for the calf, it will soon be pushed open wide enough for the cow, and then the whole herd will get through. At the watch factories the measurements are in millionths, and at the gun factories and other shops, where close work is done, they are taken in the inflexible rigidity of a steel gauge.

HARDENING METALLIC WHEELS.—To give a greater solidity and density to the metal for wheels, it has been suggested, while the casting is cooling, to give it a rapid rotary movement near the edge, where it will ultimately work most. The centrifugal force gives the desired result, in pressing the liquid metal against the outer parts. This process, used in England by Mr. Webb, some years ago, has lately been put in practice in a Pittsburg foundry.

SPIRAL SPRINGS.—One of the rules for spiral springs, when made of round steel, is to multiply the cube of the diameter of the steel wire in inches by the amount that it is to be deflected for each coil, and this product by 75,000; then divide by the diameter of the spring, measuring from the center of the wire, and the quotient will be the force exerted in pounds.

## SCIENTIFIC PROGRESS.

## Combustion and the Formation of Smoke.

When fresh coal is placed on a fire in an open grate smoke arises immediately, and the cause of this smoke is not far to seek, as it will be easily understood that before the fresh coals were put upon the fire within the grate, the glowing coals radiated their heat and warmed the air above and thereby enabled the rising gases to at once combine with the warmed air to produce combustion; but when the fresh coals are placed upon the fire, they absorb the heat and the air above remains cold.

By gases is meant the gases arising from coals while on or near the fire, and it may not be known to everyone that we do not burn coals, oils, tallow or wood, but only gases arising from them. This can be made clear by the lighting of a candle, which will afford the information required. By lighting the candle, fire is set to the wick, which, by its warmth, melts a small quantity of tallow directly absorbed by the capillary tubes of the wick, and thereby so very finely and thinly distributed that the burning wick has heat enough to be absorbed by the small quantity of dissolved tallow to form the same into gases, and these gases burning, combined with the oxygen in the atmosphere, give the light of the candle. A similar process is going on in all other materials; but coal contains already about 17 per cent in gases, which liberate themselves as soon as they get a little warm. The smaller the coal, the more rapidly will the gases be liberated, so that in many cases only part of the gases is consumed.

But the volatile gases from coal cannot combine with cold air and produce combustion. Hence combustion takes place in the following ways: The cold air, in the act of combination, absorbs a part of the warmth of the rising gases, which they cannot spare and therefore must condense, so that small particles are formed which aggregate and are called smoke, and, when collected, produce soot; but as long as these particles and gases are floating, they cannot burn or produce combustion, as they are surrounded by a thin film of carbonic acid. It is only when collected and this acid driven off that they are consumed.

It has now been shown that cold is the cause of smoke, which may be greatly reduced by care. In the open fire-grate the existing fire ought to be drawn to the front of the grate and the fresh coal placed behind, or in the back of the fire. The fire in the front will then burn more rapidly, warm the air above, and prepare the rising gases for combustion. In this way smoke is diminished, as the gases from the coals at the back rise much more slowly than when placed upon the fire and the air partly warmed.

## A New Sun Motor.

Attempts have frequently been made by Captain Ericsson and others to turn to account the energy of the solar rays. All these inventors, however, have worked with steam which only evaporates under practicable pressures at comparatively high temperatures, and to attain these it has been necessary to concentrate the sun's rays with mirrors. According to *Engineering*, M. Ch. Tellier, however, by making use of another working fluid, has succeeded in dispensing with these cumbersome and costly appliances. His engine is worked with ammonia gas, the solubility of which in water varies enormously with the temperature. Thus at 32° F. one volume of water will dissolve about 1000 volumes of gas, but at 140° F., a temperature which is frequently attained in the tropics, the amount dissolved is extremely small, hence a comparatively small range of temperature will place at his disposal large quantities of this gas under pressure. In carrying out this idea in practice the ammoniacal solution is contained in a generator exposed to the sun's rays, which, heating the solution, causes the gas to be evolved under pressure, and this is then led off to the cylinder of an engine. After doing its work here the gas is passed into a kind of condenser, where it meets with water taken from the generator through a worm surrounded by cold water, and in this way has had its temperature reduced, rendering it capable of reabsorbing the gas exhausted from the engine, after which the whole is pumped back into the generator to begin a fresh cycle.

This apparatus has been worked with a certain amount of success at Paris during the summer of last year, but the atmospheric conditions are said to have been very unfavorable, so that, though the heat-absorbing surface had an area of 215 square feet, the work done was only 43,360 foot-pounds per hour.

FLUORINE.—THE UNIVERSAL SOLVENT.—The *Mechanic and Builder* in alluding to the recent discovery of a mode for isolating fluorine says: "Fluorine is not a newly discovered substance. It has been known to exist for half a century or more; but it is only quite lately that it has been obtained in the free or elemental state. It is true that it is a most energetic solvent, if we use the word in its popular significance to indicate that it attacks substances with which it is brought in contact by combining with them to form compounds. This is the reason why it so long defied all efforts to isolate it, since as rapidly as it was formed in the free

state it immediately seized upon adjacent substances and entered into new compounds with them. It has been found that fluorine will vigorously attack any known substance except the fluorides (which, being already compounds of itself, are indifferent to it) and carbon. The chemist who succeeded in separating it only developed small quantities at a time—sufficient to identify it and study its properties. His vessels were so rapidly corroded by it that it was impossible to operate on more than small quantities at a time, and no means have yet been devised to preserve it. It may be possible to do so in vessels of fluor spar."

## Centrifugal Force.

What Shakespeare Wrote of this Great Law.

The following is from the lecture delivered recently at the Royal Institution, London, by Sir William Grove, F. R. S.: "What is commonly called centrifugal force does not come from nothing; it depends upon the law that a body falling by the influence of attraction, not upon, but near to, the attracting body, whirls around the latter, describing one of the curves known as conic sections. Hence a meteorite may become a planet or satellite (one was supposed to have become so to this earth, but I believe the observations have not been verified), or it may go off in a parabola as comets do; or, again, this centrifugal force may be generated by the gradual accretion of nebulous matter into solid masses falling nearer to or being thrown off from the central nucleus, the two forces, centrifugal and centripetal, being antagonistic to each other, and the relative movements being continuous, but probably not perpetual. Our solar system is also kept in its place by the antagonism of the surrounding bodies of the Cosmos pulling at us. Suppose half of the stars we see, *i. e.*, all on one side of the meridian line, were removed, what would become of our solar system? It would drift away to the side where attraction still existed, and there would be a wreck of matter and a crash of worlds. It is very little known that Shakespeare was acquainted with this pulling force. He says, by the month of Oressida:

But the strong base and budding of my love  
Is as the very center of the earth  
Drawing all things to it.

A very accurate description of the law of gravitation, so far as this earth is concerned, and written nearly a century before Newton's time."—*St. Louis Globe-Democrat*.

DYNAMO EFFICIENCY.—Mr. R. W. Blackwell, in an article in a recent number of the *Electrical Engineer* of London has the following on dynamo efficiency: "The dynamo-electric machine, by which the power of the steam engine is converted into electricity, has reached a degree of perfection unappreciated by those not engaged in the business. Less than five years ago the best dynamos gave an efficiency of 75 per cent; there was an excessive heating of the wire coils, and of the journals, so that a machine could rarely be depended upon for a run of 12 to 18 hours at a stretch. There were frequent burnings out of the armature, and of the commutator, and other recurring faults, which caused uncertainty and expense. At present the best manufacturers sell their machines, both dynamos and motors, with a guaranteed efficiency of 90 per cent, so that for every 100-horse power of the steam engine, 90 will appear on the line in electricity, and 81 will appear in the motor in the form of mechanical energy. The latest series of tests made with railway motors demonstrated an efficiency of 80 per cent from the steam engine to the car axles. From this must be deducted, in actual practice, 5 per cent for the line wire, and 10 per cent for contingencies of all kinds, leaving 65 per cent actually to be relied on. Therefore, from 100-horse power at the engine, 65 will be delivered on the car axle."

ELECTRIC FIRING FOR RIFLES.—A recent invention in gunnery is the use of electricity in place of the percussion lock, the battery being situated in the stock of the rifle, and the spark furnished by means of a primary coil in a manner similar to the portable gaslighters, which, as is well known, when used with chloride of silver dry battery, will stand a use of 35,000 times without recharging. It is claimed that this use of electricity as a detonator will make it possible to use the high explosives in rifles, and in this respect it may be claimed to form as great an improvement over the percussion lock as was the latter over the flint lock. This topic formed the subject of a paper by Captain S. A. Day, before the American Institute of New York, in which he gave the most favorable opinion of the possibilities of this new method of firing rifles.

AN ELECTRIC TRUMPET.—An electric trumpet has been recently devised by M. Zigang. It consists, says the *London Electrical Review*, of a short brass tube mounted on wood, and containing an electro-magnet whose ends face a vibrating plate, on which is fixed a small piece of soft iron. Against the plate-armature rests a regulating screw with platinum point, which serves for automatic interruption, by vibration of the armature. With two Leclanche elements a musical sound is obtained, which may be varied in pitch, intensity, and timbre by means of the screw. This instrument may be usefully employed in signalling on ships, railways, tramways, etc.; it may also serve as a receiver for signals of the Morse type.



## USEFUL INFORMATION.

**UTILIZING THE TIN CAN.**—Probably no one article has been put to such a variety of uses as the tin can. A woman up in Maine has found a new use for them, and she tells, in the *Levi-ton Journal*, how those too good to throw away she utilized: "I learned to use them for brown bread when touting out at the seashore where dishes were scarce and cans plenty, and I liked them so well that I kept up the practice after coming home, especially after finding out that four of them just laid in my steamer. But this is not all the uses I find for them. In a few weeks my kitchen will be decorated with old salt-boxes each filled with as many cans, minus the bottoms, as will stand up in it, each can filled with good garden soil and each of these tin pots holding a tomato, dahlia, or other plant. I find it easier to transplant without disturbing the roots when the plants are so treated, and having no bottoms, the cans do not hold water enough to spoil the roots, as might be the case were they used separately. Sometimes I have sunk in the soil in the garden, near a plant that needed a good deal of water, an old can with a hole or two punched in the bottom to help it to leak, and then filled this can with water each night or morning. I also found this a good chance to add fertilizers by putting them in the water. John likes the cans to put around the trunks of young fruit trees. He says he has saved enough trees from the mice in this way to pay for all the canned tomatoes, corn, and peaches we have eaten. He takes off the bottom, cuts open one side, fits them around the stem, and draws the sides together again, and then pushes them down so that an inch or two is below the surface of the soil. The pieces of tins straightened out have also done duty as scarecrows, dustpans, and several other things in an emergency."

**BULLETS FOR SMALL BORE RIFLES.**—A series of experiments have lately been carried out in Austria on the projectiles for small bore rifles. Three varieties of bullets were used, namely, balls of hardened lead, of lead with a steel jacket, and of lead with a nickel jacket. In the experiments on penetration, copper-coated bullets were also employed. The rifles used were the Kropatschek and the Nagant. The first is of .315-inch caliber and is rifled with four grooves, making one turn in 35 caliber; its barrel is about 2 feet 8½ inches long, the weapon weighing slightly over 10½ pounds. The Nagant is of the same calibre, but is rifled with six grooves with a pitch of 31 calibers. The barrel is of the same length as the Kropatschek, but the weapon weighs rather less, or about 8.84 pounds. The bullets were tested with regard to accuracy of fire, penetration, and on the effect of prolonged fire, and in all these respects the jacketed bullets took the first place. In particular, by the rapid fouling which occurred with the hardened lead ball, the accuracy of the weapon was rapidly spoiled, which did not occur with the other projectiles. As regards penetration, the best results were given by the steel-coated ball, though the difference between it and the one with the nickel jacket was never very great, both bullets giving results greatly superior to those obtained with the hardened lead balls. The rifles were in no cases injured by prolonged firing of any of the projectiles.

**A SUBSTITUTE FOR TYPE METAL.**—The attempts hitherto made to substitute other material than type metal for the manufacture of type, stereotype molds, borders, reglets, etc., have been mostly attended with serious disadvantages. For example, the use of glass type was soon abandoned because it was too brittle and did not retain the ink efficiently, the printing consequently being indistinct and blurred. The latest innovation, however, is that of Meers, F. Kammsn of Vienna-Neustadt, who uses an artificial stone. It is claimed that this stone can be readily molded and is cheap; it is hard, yet sufficiently elastic to bear any great pressure without injury, whilst the type molded from it will readily take up, retain and give off the ink. For large type letters the substitute is stated to be especially suitable. The manufacture is as follows: Finely powdered silicic acids (kieseläuren) of greater or less degree of purity are intimately mixed with a small quantity of hydraulic lime; fluid silicate of soda (kieseläuren natrium) is poured over the mixture and is kneaded until it becomes a uniform plastic mass, which is then pressed into suitable molds, or the mixture can be poured in a fluid state into the molds. When the mass has hardened, it is then taken out of the molds and dried.

**TO PERFORATE EARTHENWARE.**—The *Scientific American* gives the following method of perforating earthenware: "A soft copper rod or pipe is used in the lathe, it being fed with a mixture of powdered emery and linseed oil. The emery is imbedded in the copper by the friction, and cuts right through the hardest material in a very short time."

**TO PROTECT CLOTHING FROM MOTHS.**—It is doubtful if there is any known reliable and unobjectionable means of protecting clothing from the moth, excepting that of tightly inclosing it in some material not subject to the ravages of this insect. I have had clothing badly moth eaten while kept in a bureau made wholly of red cedar, but have never known the moth to

enter a tightly-tied sack of cotton cloth. For the preservation of an overcoat, for example, through the summer, the following is recommended: Take a piece of unbleached cotton sheeting, 45 inches wide and about 10 inches longer than the coat; fold lengthwise and sew the side and one end, thus forming a sack 10 inches longer than the coat and 22½ inches in width. Thoroughly brush the coat, and hang it up by a stout cord 6 or 8 inches in length, passed through the usual tape on the inside of the collar. While thus suspended, draw the sack upward over the coat, gather the upper end of the sack closely around the suspending cord, and tie tightly with another cord. Let the coat hang until needed for use. When taken out, it will be found free not only from ravages of the moth, but from dust and wrinkles also.—*Manufacturer and Builder.*

**METALLIC CEMENT FOR STONE.**—The restoration of some of the most important stone structures in Paris, such as the colonnade of the Louvre, of the Pont Neuf, and of the Conservatoire des Arts et Metiers, has been mainly accomplished by means of a metallic cement invented by Prof. Buene. It consists of a powder and a liquid, the first composed of two parts by weight of oxide of zinc, two of crushed limestone and one of crushed grit, the whole intimately mixed and ground, other in suitable proportions being added as a coloring matter; the liquid employed consists of a saturated solution of zinc in commercial hydrochloric acid, to which is added a part by weight of hydrochlorate of ammonia, equal to one-sixth that of the dissolved zinc, and this liquid is diluted with two-thirds of its bulk of water. One pound of powder is mixed with 2½ pints of liquid.

**FASTENING LEATHER TO IRON.**—The following, on the authority of Dr. Heinichen of Dresden, it is said, will fasten leather to iron or steel so firmly that they can not be separated: Soak the leather with a warm solution of gall-nuts, spread thinly over the metal a solution of the best glue (hot), place the two together with a pressure on them, and leave to dry.

**TO STICK PORCELAIN ON GLASS.**—Good cement for sticking porcelain letters on glass: Starch, 60 parts; finely pulverized chalk, 100 parts. Mix with equal parts of water and alcohol, with the addition of 30 parts of Venice turpentine, taking care to agitate the mass with a stick so as to insure its homogeneity.

**SHADE YOUR LIGHTS.**—At the general meeting of the American Gaslight Association, Dr. Morton, the well-known physicist, warned people against the use of unscreened electric and gas lights. Lights should be placed above the visual range shaded so as to produce a diffused and equable light.

## GOOD HEALTH.

**HOW TO DETECT THE SYMPTOMS OF SEWER POISON.**—How shall one know when he is poisoned by sewer gas? is a question frequently asked. Dr. Hun, in the *Medical News*, says that he has carefully studied 29 cases, and thinks it probable that the following condition may result from sewer-gas poisoning: Vomiting and purging, either separately or combined; a form of kidney trouble; debility, in some cases in which the heart is especially involved; fever, which is frequently accompanied by chills; sore throats, which is frequently of diphtheritic character; neuralgia. These conditions may occur separately, but are frequently combined, and it is especially common for the fever to be associated with the other forms of sewer gas poisoning. Finally, in cases of sewer gas poisoning, there is one group of systems which is almost always prominent, and these symptoms are loss of appetite, drowsiness, extreme prostration, and a dull, unpleasant feeling in the head; and whenever this group of symptoms occurs, not as the result of an attack of acute disease, but as a chronic condition, a suspicion is justified that the patient is exposed to sewer gas infection. More or less satisfactory evidence has been adduced that the following diseases may result from sewer gas poisoning: Zymotic diseases, such as typhoid fever, pneumonia, diphtheria, cholera, dysentery, cerebrospinal meningitis, erysipelas, and scarlet fever; a condition of apyrexia which, in its severe form, is characterized by coma, convulsions and collapse; puerperal fever, abscesses, lymphadenitis, and possibly acute aural catarrh.

**THE TEMPERATURE OF THE SKIN.**—The experiments of Davy long ago demonstrated irrefutably that the temperature of the interior of the body varied little in man with race, climate or season; yet it is familiar to all that the temperature of the skin varies considerably in different parts—the extremities for example, and those parts of the skin where the circulation is feeble being cooler than other parts. Quite recently some interesting experiments to determine these variations of the surface have been made by Professor Kunkel at Würzburg. Taking the skin of the face in the first instance, he finds that in men from 20 to 30 years of age it varies from 85° to 89° Fah., with an approximate average of 88°. The skin of the more exposed parts of the body, as the tip of the nose and the lobules of the ear, in which the circulation is slow and feeble, exhibited a lower tem-

perature, not exceeding in many instances 75°, or even descending as low as 71.5°. The skin covering the muscular portion of the body is warmer than that over the bones and tendons. Contraction of the muscles caused the temperature of the superficial portion of skin to rise one degree or more. The decrease of temperature from the skin to the outer covering in a room at a temperature of 63° was as follows: On the skin 88°, on the linen shirt 82°, on the vest 75°, and on the coat 72°. The highest temperature was found to occur in men in the full vigor of life. As a singular fact, Dr. Knobel states that children otherwise in perfect health showed a much lower degree of surface temperature—from 77° to 84°—than adults. He does not appear to have followed out Professor Lombard's observations on the temperature of the head.

**THE SAFEST WAY TO FALL DOWN.**—"The special providence that seems to hover over drunken men and children has something of an explanation," said a well-known and eminent medical man to a reporter, "in the fact of the main cause of the breakage of bones from falls being from a resistance of the tendons more often than from the violence of the shock incident to the actual fall. A child or an intoxicated person will rarely endeavor with any great effort to recover their balance when they slip or topple over. Hence no special resisting force is exercised, and they sink into a collapsed heap without serious injury. When an adult in possession of his full sound senses undertakes with endless contortions and gyrations to save himself from going down, he draws every muscle and sinew taut, and if the wrench is too severe the bone breaks. There is no way of definitely proving it, but it is asserted, and I believe with some degree of truth, that some, at least, of the fractures resulting from falls, especially from a height, happen before the actual shock with the substance one falls on occurs. It's strange, but I guess it is the truth."

**CALIFORNIA CLIMATE.**—The complaint is sometimes made by Eastern people that the average of human life in California is not as great as it is in the Atlantic States. If that is so—which we doubt—it may be explained by the fact that great numbers of invalids come to this State, by which their death rate is unnaturally increased; and again, people do not take the same care of themselves here that they do East. If men do not reach the average of life here it is also in part because they abuse themselves in various ways here as they do not in the East. They work too hard. Our "glorious climate" gives them strength beyond that usual in other places, and they do not perceive it until they have overtaken themselves in labor or in the pursuit of business. Moreover, a large portion of our people live too high, drink too much, go to excess on tobacco, and in every other thing in which people can exceed the limit prudence would dictate. The graveyards are not peopled by middle aged and young men because of climatic conditions.

**CAUSE AND CURE OF WRITERS' CRAMP.**—The affection known as writers' cramps is not confined to users of the pen, but appears in telegraphers and others, who make continual use of one set of muscles. These cramps have been variously supposed to result from a diseased condition of the brain, spinal cord or nerves, and were long regarded as incurable. During several years past, however, Wolff has been applying gymnastics combined with massage to the muscles affected, and has succeeded in curing more than half of the many cases treated. His process is neither difficult nor tedious, being simply regular movements of the fingers or other parts, with rubbing or gentle striking of the muscles, continued not more than an hour a day for several weeks.

**INTERESTING TO EVERYBODY.**—The feet can be kept warmer in cold weather by wearing a shoe with a light sole than a thick one. With the former the shoe has a chance to work, thereby keeping up a circulation. This, of course, applies only when the weather is dry; but when it is wet, and rubbers are necessary, it is best to wear a single-soled shoe inside. In the summer the thick sole should be worn, for it keeps the heat from striking through to the foot. This is all so contrary to the preconceived opinions of the public that it is doubted whether it will receive much credence, but it is the fact all the same.—*Shoe and Leather Reporter.*

**TONGUE INDICATIONS.**—According to Dr. Howship Dickinson, a furred tongue is not necessarily an alarming symptom. To some persons it is normal to have a clean tongue, and to others equally normal to have a coated tongue, so that it is impossible to fix any degree or limit of coating as a necessary accompaniment to perfect health.

**MILK IN SUMMER TIME.**—An argument against allowing children to drink milk in the summer time is drawn by Dr. V. C. Vaughn of the University of Michigan, from the liability of the fluid to develop the poison—tyrotoxin—which is supposed to be the immediate cause of summer diarrhoea.

**COLOR-BLINDNESS AMONG SEAMEN.**—The fact has been noted that seamen, as a rule, are peculiarly subject to color-blindness. In tests made in the British mercantile marine, standard green was pronounced red in 107 cases out of 189.

## ENGINEERING NOTES.

## The Panama Canal.

De Lesseps' wonderful perseverance and almost sublime audacity, says the *Mexican Financier*, still retain for him the loyalty and confidence of a great army of friends in France and not a few in the United States. It is believed by some of the American contractors at the canal that it will be open to navigation, by the lock system, in 1890. By succeeding to a change of plans which permits the postponement of the sea-level canal for a time, we think that the Great Frenchman showed his practical wisdom. He has made it possible to regard the completion of a water-route across the Isthmus of Panama as a probability—not merely a vague and distant possibility. The great ironworker, Eiffel of Paris, who is building the huge tower for the exposition of next year, has taken the contract for the locks, eight in number, at the canal, and this indicates on his part a reasonable degree of confidence in the completion of the stupendous work with which the French people have linked their name. The locks, which are already being constructed, are not designed to be a permanent feature, but are adopted through the necessities of completing the works and opening up the canal within the required time. The building of these locks requires the outlay of prodigious sums of money. The locks number 10, and are located five on the Pacific side and five on the Atlantic side of the isthmus. The general width of the canal proper is a very small fraction over 61 feet.

The sanction of the French Chamber of Deputies for the lottery scheme has finally been announced, and it is thought that this measure will furnish all the funds needed to complete the work beyond that now in sight. This sum is now estimated at \$70,000,000.

**ELECTRICAL RAILROADS.**—An examination of electrical railroad statistics shows that there are 130 miles of road in operation on this continent. Of this number of miles 21 are in operation in the State of Pennsylvania, 16 in the State of New York, 10 in Ohio and 83 miles in other States. Almost all of this building has been done in the past year. On these various roads, constructed and constructing, in 62 different towns and cities, the Van Duesen system is used or to be used in 17 cases, the Daff system in 15 cases, the Sprague system in 7 cases and the Bentley-Knight, the Heart, the Henry, the Julien and other systems in the remaining cases. The last-named system is to be used on the projected New York and Harlem Fourth Avenue electrical railroad.

**GROWTH OF AMERICAN RAILWAYS.**—The evolution of the railway and of its rolling stock follows the same laws which govern the rest of the world; adaptation to circumstances decides what is fittest, and that alone survives. The scrap-heap of a great railway tells its own story. Our railways have now reached a development which is wonderful. The railway of the United States, if placed continuously, would reach more than half way to the moon. Their bridges alone would reach from New York to Liverpool. Notwithstanding the number of accidents that we read of in daily papers, statistics show that less persons are killed annually on the railway than are killed annually by falling out of windows.

**THE ZUYDER ZEE.**—There has been considerable talk of late of reclaiming the Zuyder Zee, and now it is said that a fund is being raised in Holland to defray the expenses of a survey of the same with a view to its drainage. This sea was formed in 1282 by the breaking of land barriers and engulfed 72 villages. It is proposed to dam the entrances, and pump out the present sea, leaving a small lake connected by a canal with Amsterdam.

**ELECTRIC LIGHTS.**—It is said that the Westinghouse Electric Co. has just completed an incandescent lamp which will give much better results than heretofore placed upon the market. Formerly a lamp which burned 400 hours was considered good. That figure was soon doubled, but the new Westinghouse lamp, it is claimed, will burn from 2500 to 3000 hours.

**SILVER IN BELLS.**—A correspondent of the *English Mechanic* says: "I once asked a foreman in a well-known bell-foundry whether putting silver in a melting-pot was of advantage. He replied: 'Of great advantage—to the founder, as the silver sinks to the bottom; the founder pours off the copper and tin, and when the silver has cooled, puts it in his pocket!' It may be that a bell made entirely of silver would sound well; but this is mere conjecture."

**A STEM WINDING SCREWDRIVER** has been made in Philadelphia, with the handle in two parts, said parts being capable of rotating one upon the other. A stop-pin and pawl limit the movement of the shank in one direction, while the top of the handle will move backward without turning the shank. The mechanism appears to be very similar to the principle of a stem-winding watch.

**WOOD PULP VS. PLASTER OF PARIS.**—Wood pulp is rapidly being substituted for plaster of Paris in the manufacture of all kinds of building ornaments in France, where a new method has been devised.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

### CALIFORNIA.

#### Amador.

**CLEANUP.**—Amador Ledger, June 9: The Volcano Gold Gravel Mining Co. made a thorough cleanup on their claim in Volcano basin. The bullion was sent to San Francisco this week. The amount of the cleanup we have not heard, but it is the general opinion that the operations this season turned out much better than last year, as the ground worked was considered far richer than any heretofore mined by the company.

**STOPPED WORK.**—Work on the Gillick mine, near Volcano, has come to a standstill. This property was recently bought by San Francisco parties, who started in to open it up in good shape. When sold, the mine showed every promise of paying, but it seems the prospects did not hold out, and the company concluded to quit. This is a severe blow for that mining section. It was thought that the Gillick was likely to lead to renewed interest in quartz mining in that region, and that it should prove otherwise is bitterly disappointing. The 1st of June passed without any attempt being made to open the Plymouth Con. mine at Plymouth. Nobody seems to have any definite idea as to when the mine will be opened. Timbers are being received at the mines, but they were mostly, if not all, contracted for before the fire broke out. The stock is selling in New York at from \$9 to \$10 per share.

**PLYMOUTH.**—Cor. Amador Ledger, June 9: There is not much change in the mining outlook since our last letter. The New London is hard at work. The Plymouth Con. is doing nothing but hoist water, with a prospect of having that recreation stopped, as the shaft is closing together, so that the skip moves up and down with difficulty. A. M. Vaughn has got the Lady Bedford mine shaft cleaned out and retimbered as far as the old sinking went. Some very rich quartz was brought up, from the bottom.

**SUTTER CREEK.**—Cor. Amador Ledger, June 9: G. W. Horn, who has been expected here for the last two months to start up the Mahoney, has arrived. The first consideration is the motive power to run the machinery. It is the intention to run everything by electricity. They propose to go to New York ranch, a distance of six miles, where they can get water-power almost free. The laying of the wire will entail an expense of between \$3000 and \$4000, but when once in position the expense of running will be comparatively trifling. It is intended to start the mill the first thing, so as to get some income from the property, while the surface improvements are being made. They will run on surface dirt until the shaft is placed in working order.

#### Calaveras.

**THE CONFIDENCE.**—Angels Echo, June 6: The Confidence mine, located a short distance southwest of the Utica, is rapidly taking its place among the leading mines of this section. Two shafts are being sunk, one of which is now over 100 feet in depth and all the way down in good ore. A drift will soon be commenced which from present indications will develop even a larger body of ore than has yet been found. The other shaft, which is somewhat south of the first mentioned, is down about 20 feet and the lode is fully seven feet in width and constantly increasing as depth is attained. A ten-stamp mill is now in course of construction and will probably be completed in the course of a month or two. Only five stamps will be used for some time to come. The others will be held in reserve until the further development of the mine. The Confidence is no doubt a continuation of the famous Crystal lead and is therefore a valuable property.

**NEVILLS.**—Work is steadily progressing on the Nevills mine in this town, and everything is running smoothly as usual. In the course of a few days sinking will be commenced in the main shaft at the 400-foot level. This mine is under the management of men who thoroughly understand how to conduct it to the best advantage.

**UTICA.**—The new shaft on the Utica mine is being sunk rapidly. The mill was started up the other day and is now running steadily. Forty stamps are soon to be added to the 20 already running. Besides, we are told that other and more extensive works are to be erected.

#### Fresno.

**FANCHER CREEK.**—Cor. Fresno Expositor, June 8: A large and well defined vein of copper and silver-bearing ore have been discovered at Fancher Creek. A number of tons of ore have been extracted, and is now on the dump awaiting shipment to Oakland to be smelted. The parties owning this mine are employing several miners, and are both sinking and drifting. They are paid \$125 per ton for the ore as fast as they can put it on the dump. Messrs. Freitch, Jensen and Ninnis have discovered and made two locations with our District Recorder, on a copper and silver-bearing lode on Big Dry creek, about a mile from Budge's store. Although they have not developed their mine to a very great extent as yet, they have shown enough to induce them to commence running a tunnel. We were at the mine and saw a pile of very fine-looking ore; in fact, with the exception of a little soil from the very surface, all they had taken out of their prospect holes was ore—and good ore at that. Messrs. Gross and Ball had a very unfortunate cave in their tunnel last week, which will prevent them from working in the face for a while, but they are making good headway in repairing the break. The Peterson Bros. are pushing their tunnel on the Valley View mine, and expect to connect with their upper shaft shortly. Work is going on in the Confidence mine with the usual vigor. The foot-wall drift is being rapidly pushed ahead, and there is a day and a night shift working. For lack of water they have shut down the mill for the season. Messrs. Wyatt & Co. are working their mine on Fancher creek.

#### Inyo.

**TIN ORE DISCOVERED.**—Inyo Independent, June 9: In the Inyo mountains, a short distance from Independence station, is a large vein or ledge that miners have often looked at, but as it shows no evidence of carrying gold or silver, no one has ever tried to do anything with it. A few days ago Mr.

A. J. Davis examined some of the ore, and as it closely resembled tin ore he had seen elsewhere he assayed for that metal. The result of the assay led him to believe that the ore carries tin, and plenty of it. Samples have been sent for assay to various places. If the ore shall be found to contain tin in paying quantities there is a large ledge and it is very easy of access.

**NEW LEDGE.**—Mr. Hannigan came in from Panamint last Wednesday. He had been prospecting and found the best looking ledge yet discovered in the district. The vein is six feet wide for a distance of at least 1200 feet, and has been prospected to a depth of 11 feet. The ore is galena and carbonate. The carbonate carries 182 ounces of silver per ton and 67 per cent lead; the galena carries 70 per cent lead and 46 ounces silver per ton. The claim is six miles northwest from the town of Panamint and five miles northeast from Hot Spring. There are other parties interested with Mr. Hannigan, and the mine is likely to be worked without delay.

**MILL.**—Mr. J. C. Eddy of Darwin has been over at Panamint recently. It is understood that the object of his visit was to settle the question whether or not he should put up a mill there. It is reported that he has decided to build a mill, or move one from another place during the summer.

#### Mariposa.

**MOUNT RAYMOND MINES.**—Mariposa Gazette, June 9: A rich San Francisco Syndicate who are interested in the Mt. Raymond mines, are now engaged in building a wagon-road from Fish Camp to Mt. Raymond, a distance of four miles. They are preparing to run a 700-foot tunnel through the mountain at Mt. Raymond, from which ore will be taken and probably shipped below. There is a great amount going on and in contemplation, in this as yet undeveloped section of country.

#### Monterey.

**SLACKS CANYON COAL MINE.**—Salinas Index, June 3: Four six-horse teams are engaged in hauling coal from Slacks canyon to San Miguel. Three tunnels have been run in the mine, one of which is in 1150 feet, 900 feet of that distance being through a solid body of coal. There will, undoubtedly, be a branch railroad to the mine in the near future.

#### Napa.

**QUICKSILVER SHIPMENTS.**—Calistogan, June 8: During the month of May flasks of quicksilver from the mines here mentioned were shipped from Calistoga to San Francisco as follows: Bradford mine, 429; Napa Consolidated mine, 320; Sulphur Bank mine, 185; Great Western mine, 69; total flasks, 1003. The Bradford mine is producing finely, and its owners are making money rapidly. The Napa Con. mine is also producing well, and must afford a good profit above working expenses. Supt. Rocca, at the Gt. Western, continues to ship enough to pay working expenses. He will finally do better if the cinnabar can be found in the company's ground. He's a stayer.

#### Nevada.

**CEDAR.**—Tidings, June 8: Work on the Cedar mine at Nickerson's ranch, Wolf creek, will be resumed next week by the Grass Valley Mining and Development Co. When the winter rains caused suspension of operations the indications in the mine were very favorable.

**NEW MILL FOR THE PITTSBURG.**—Nevada Transcript, June 9: Mr. Elliott, under whose superintendency work is about to be resumed on an extensive scale at the Pittsburgh quartz mine in this district, is arranging for the erection on the claim of a first-class 20-stamp mill. The company having control of the property are said to be possessed of sufficient working capital to start it up in good shape. Heretofore the Pittsburgh has been conducted as a Grass Valley enterprise, the benefits from its working being derived principally by that town. Hereafter Nevada City will be likely to get the bulk of the business from it.

**POCKET MINING.**—Tuolumne Independent, June 2: It is reported that the Bonanza mine has suspended its flow of gold for the present, the vein having pinched out. As it costs the present lessees about \$1500 per month to run the mine, and as their lease expires July 1st, they probably do not care to put in a month's work with the possibility of giving some one else the benefit of their labor. If this is correct, it shows that these gentlemen are as sensible as they have been successful. Colby, Shaw, Jenkins & Co., working the Gold Nugget mine, have taken out several hundred dollars in prospects during the past 10 days, and hope soon to strike it rich. The Experimental mine is being run by the "boys" on shares. Messrs. Louis and John Engelke, John P. Conlin, Geo. Stayton and Henry Dunn, are the ones interested. Pocket mining seems to be attracting more men than the usual interest. The pocket miners are a hopeful set at best—a splendid exemplification of pluck, patience and perseverance.

**THE NORTH BANNER.**—Fletcher, Glasson & Co. of Grass Valley, have been continually prospecting on the north extension of the old Banner mine for years. They have performed a great deal of work, among which is a tunnel 1500 feet in length, numerous shorter ones, and shafts by the dozen, we should judge from a distant view. They have a five-stamp mill, run by water-power, which is kept constantly in operation. They are doing a great deal of dead and development work, and the mill pays for it all and declares a dividend besides. John Skewes is managing foreman. The mine is at present working 20 men. The tunnel gives about 400 feet backs, which affords the rock being crushed at present. The company are raising a shaft to the surface for the purpose of conducting water to the tunnel level, where hoisting machinery will be put in. This will enable them to sink about 300 feet deeper. The winze below the tunnel shows the ledge to be solid and gaining in width—it being over two feet now. The quality of the rock is A No. 1. It is heavily sulphureted and carries free gold in paying quantities. The North Banner is the coming mine. It is conveniently located for water-power, and is accessible from both Nevada City and Grass Valley. It is about 2½ miles from this city. The owners are going to be rewarded for their energy and pluck, and everyone is glad of it.

**GOOD QUARTZ.**—Grass Valley Union, June 9: On Tuesday a body of extra fine milling quartz was opened up on the 16th level of the Empire mine south of the main incline. The quartz, without being of the kind known as "specimen rock," showed

gold very freely, and about 1000 pounds of it was found rich enough to select. One piece of the quartz about three feet in length was estimated to contain as much as \$500. The ledge is two feet in thickness. This find is important in this, that it is rich rock in the bottom of the mine, as that is the lowest level on that side, the 17th level not being opened south, but north of the shaft. It is very encouraging, as it goes to prove what the last few years has unmistakably demonstrated, that the gold mines of the Grass Valley district improve in value and in size of the veins as depth is attained. The Empire, North Star and Idaho are living, and illustrious examples of this, and are as reliable to-day in their yield as at any time in their history. It is this finding of rich ore at great depths that must give encouragement for the rehabilitation and exploiting of old mines, which have lain idle for years, and will encourage the opening of others from the grass roots.

**THE MANZANITA MINE.**—Nevada City Herald, June 8: The owners of the Manzanita gravel mine are making some very important developments for themselves and for this district. They have drifted in and proven that they have a deposit some 600 feet in width, which will pay well for drifting. They are doing deadwork in the way of opening up the mine, so a large force of men can be employed. Orrin Gowell is probably one of the ablest and oldest gravel miners in the State. Si. Wheeler is also regarded as an expert in that kind of mining. The two men are confident they are on the track of a very rich and extensive deposit. They have thoroughly prospected as they have proceeded, and know just what they are about. It will not be long before more men will be employed in the Manzanita than in any quartz mine in this section. The prospects of this town will be greatly affected by their operations. The Nebraska, on the other side of the ridge, will also add much to the resources of the town when it commences.

**PROSPECTING FOR GRAVEL.**—Nevada City Herald, June 8: There is considerable activity on the Washington ridge in prospecting for drift mines. The Centennial and San Jose mines are pushing ahead developments and will determine the value of those claims this summer, it is hoped. Below there, near the Central house, Steele & Hanson are running to strike the channel this side of the Fillbuster claim, and are feeling greatly encouraged. Williams & Peterson, just above Cold Springs, near the Central house, have run in a tunnel 900 feet and are now raising up expecting to strike the channel almost any day. Chris. Ivey has a claim back of the Central house, toward Deer creek, on which he has done a great deal of work, but running out of funds, he has temporarily suspended and gone to work at Marsh's sawmill to replenish, when he will return and commence operations again. There is gravel, good gravel, and lots of it on that ridge, and it will be opened up some day, and perhaps this season.

#### Placer.

**DARDANELLES.**—Placer Herald, June 9: The old Dardanelles mine is paying well. The mill runs like a clock, and each clean-up shows an increase in the output of gold. The storm of Sunday broke the ditch and delayed crushing for a time, but the break has been repaired and the mill is pounding away.

**SINKING.**—The Gray Eagle shaft is down 285 feet. Operations have been delayed by the loss of a pump. According to the latest report, sinking was resumed Wednesday.

**MAYFLOWER.**—Mr. F. Chappellet, superintendent of the Mayflower mine, informs the Herald that he is not doing anything at the mine, simply looking after the machinery and other property until the new company takes possession. Mr. Chappellet says the owners of the Live Oak are well satisfied with the output of that mine. The gravel is very nearly five feet thick, and the channel 268 feet wide. He is running toward the rim on the eastern slope, and is but a short distance from the deepest and narrowest part of the channel. He will also make an upraise and tap a blue lead that is only a few feet above the tunnel.

#### Plumas.

**INDIAN VALLEY.**—Greenville Bulletin, June 9: The mill has been started up and is now running steadily. Mr. Prentiss is actively engaged superintending the mine. He has about 25 men in his employ.

**WOLF CREEK.**—The recent strike at that place is attracting much attention. The owners have drifted 90 feet on the vein, which shows up finely and prospects well. The owners are trying to make arrangements to fit up a mill and crush the ore.

**PACIFIC.**—This is owned and worked by Geo. Standart. In the present drift the vein is seven feet wide, and is increasing in size as progress is made. The stipes contain good ore which is crushed at the Kettle mill close by.

**DRURY.**—The road to the lower tunnel was completed several days since, and the hauling of ore from this place has begun. In the tunnel, a station is being opened up, and the full width of the vein, which is reported to be 16 feet, is being extracted. The ore is better than ever before had in the mine.

**GOOD YIELD.**—Justice Pierce sold to L. R. Anthony 17 tons of quartz which belonged to the late James Tennant, and which had been carried by him and piled up near his cabin. Anthony paid one dollar per ton for the ore, hauled it to the Indian Valley mill, had it crushed, and obtained 32 ounces of amalgam, which is probably worth \$225, or about \$13 per ton. Tennant had washed all the fine material from the quartz sold to Anthony. Evidently the ore was of excellent quality, and it is claimed that it came from the Indian Valley mine.

#### San Benito.

**QUICKSILVER.**—Hollister Free Lance, June 9: Flattering reports are received of the progress being made at the Gypsy mine. One thousand pounds of quicksilver were shipped from there this week, and the indications are considered decidedly favorable by mining men.

**COPPER.**—Mr. G. W. Towle has obtained two experienced miners who will proceed at once to complete the tunnel now being run in the Antelope copper mine.

#### Sierra.

**THE ALASKA MINE.**—North San Juan Times, June 8: From a gentleman recently in the vicinity,

we learn that the above mine and mill are in operation. Owing to attachment of the "lower wood-pile," delay was feared in the running of the mill, but this has been obviated by obtaining fuel from a neighboring woodman. The former employees of the Alaska Co. are working the mine, which is in the hands of Mr. Jackson, the recently appointed receiver. After paying expenses of a run, the employees are to receive their wages for that time; the surplus profits, if any, are then to be used in liquidating the workmen's claims for past services. It is to be hoped that the expectations of the Alaska's miners will be realized and that they may succeed in obtaining every cent due to them. When a body of men manifest willingness to do the square thing and pull off their coats and go to work, instead of becoming discouraged and loafing around waiting for somebody to start an industry and give them employment, it speaks loudly for their disposition and faith in the work undertaken.

**ST. LOUIS.**—Sierra Tribune, June 9: The Union Con. mine of Happy Hollow is in full blast. The tunnel is in 1250 feet and it is expected to reach gravel soon. The Excelsior mine has been closed down for some time on account of bad air and some little misunderstanding between Mr. Hendel and the contractors, which matter, however, has been settled by the latter being paid in full. The tunnel is now in about 500 feet, and in a few days work will be resumed with renewed energy. A contract is to be let to run ahead the tunnel at the Imperial mine. At the Young America mine \$18,500 was cleaned up as the result of last month's run.

#### Siskiyou.

**MINERAL RESOURCES.**—Yreka Union, June 9: Siskiyou county, the most northern of the California counties, has been but little explored for its mineral wealth, and less developed. Our county abounds in metalliferous deposits, second to none in the State, which are as yet intact and unexplored. Our secluded position did not encourage capitalists to embark in any mining enterprise that required large investment, skilled and expensive labor in comparatively inaccessible regions, the mines of the southern counties being nearer at home. This county is traversed from east to west by numerous streams, cutting deep gorges through the mountain chains and bisecting two prominent mineral belts, which by erosion and decomposition through time, have deposited their auriferous contents in the river beds and bars that traverse this county, rendering it the El Dorado of the early gold hunter. But immense areas of rich placers yet remain intact, with both labor, skill and capital to work them, either by extensive tunnels or the hydraulic process. Here on Siskiyou we can hydraulic without let or hindrance; there are no agricultural lands that can be injured, as the debris passes through deep canyons into the gorges or the Klamath river thence into the Pacific ocean. Our mineral belts course northerly and southerly through the county, and are of great width and well defined, containing deposits and veins in place of all the precious and baser metals and minerals that are utilized by man. Gold, silver, copper, lead, antimony, zinc and arsenic, with a sandstone for building material that is pronounced by experts in the employ of the Oregon & California R. R. superior to any on this coast. Iron and marble are also found. All of this mineral wealth that has lain so long dormant and unprofitable can and will be made available for the uses of man by the advent of the Oregon & California R. R.

#### Tuolumne.

**DONELLA.**—Union Democrat, June 9: Report has it that a company will soon take hold of the Donella mine at Arastaville. Mr. Lane informs us that he is getting along very well with the preparatory work on his mine at the Dickson ranch. He is erecting suitable houses, blacksmith-shops, etc. The main working shaft has been started, and is now well under way. The gentleman will put on a night and day shift next week.

**GRAVEL.**—The gravel mine of Thomas Skaggs and E. F. McTarnahan is developing well, and is no doubt a large and splendid claim. A tunnel runs under Table mountain a distance of 400 feet between two bodies of gravel, the blue and the gray. The blue body of gravel is evidently the old river channel and as drifts are run in under the mountain it appears to widen. It thus far ranges in thickness from 6 inches to 3½ feet. The tunnel has run along the shore of it for 75 feet and the face of the tunnel is in gravel nearly four feet in thickness. There is no telling as to the extent of this body of materials, since a tunnel 800 feet south of the present works reaches in and taps the same description of gravel, while north of this point for a considerable distance no tunnels have been run. Both the gray and blue gravel prospects well. Six dollars to a carload of 1000 pounds is no unusual thing, and from parties who were there last week it is learned that both bodies of material, prospect from a few colors up to a bit a pan. Taking it all together this is a superior property and a little capital would give it a position among the foremost mines of this State.

#### NEVADA.

##### Aurora District.

**DURAND.**—Esmeralda News, June 9: The ledge in the Durand mine has widened to six feet, and assays over \$100 clear across the face. This is said to be at a depth of 280 feet.

##### Washoe District.

**BELCHER.**—Virginia Enterprise, June 9: The 500 west crosscut advanced 25 feet during the week, making the total length 46 feet. The face is in soft porphyry. The 1300 raise advanced 12 feet in quartz assaying from \$10 to \$12 per ton. Have started to run north on the ore found in the raise near the south line on the 1300 level, and are now in six feet in fair-grade ore. Repairs to the shaft are progressing rapidly.

**BENTON.**—Have resumed work on the 725 level. ALPHA.—Have commenced to sink to the 500 level.

**POTOSI.**—The north drift on the 550 level is in 567 feet—still in quartz.

**CHALLENGE.**—The raise from the 1100 is up 126 feet, 16 feet having been added during the week.

**BULLION.**—Have started south from the bottom of the winze on the 640 level and advanced 25 feet.

**OCCIDENTAL.**—Have extracted 10 tons of ore. The Atlanta mill, capacity 25 tons, has been leased



by the company, and started crushing ore from the mine on Thursday last. Have shipped 60 tons to the mill.

**SCORPIO.**—The south drift on the 300 level is now advanced 315 feet, 40 feet having been added since last report.

**IOWA.**—The south drift from the east drift has been advanced 25 feet; total, 135 feet. The face is in good vein matter.

**HAYWOOD.**—Are prospecting in the winze below the tunnel level, and have lately struck much higher grade ore than above.

**SEC. BELCHER.**—The south drift from the 1300 raise advanced 15 feet during the week. No change to report in the ground.

**UTAH.**—372 level: The south drift has been extended 60 feet; total, 340. The formation is porphyry, clay and quartz, showing nominal value by assay.

**BALTIMORE.**—The water has been drained out of the mine, and are now cleaning the slum out of the drifts on the 380 level, preparatory to the resumption of work.

**ANDES.**—Are running south from the east crosscut on the 350 level in very good-looking quartz. Are sinking a winze on the 240 level 700 feet north of the shaft.

**MONTE CRISTO.**—Superintendent Strother has resumed work in this mine, and is now running to make a connection between the old and new shafts for purposes of ventilation.

**BEST AND BELCHER.**—El Dorado Level: The northwest drift from the main west drift has been extended 48 feet; total length, 205 feet. Formation quartz, showing value by assay.

**ALTA.**—The ore reserves on the 825 and 1150 levels are yielding their usual quota of ore, which is being reduced at the mill. All the machinery is running smoothly, and the mine is looking well.

**LADY WASHINGTON.**—Are raising from the 725 level, and are now up a distance of 335 feet in clay adjoining the veins. Are crosscutting from the raise at a height of 110 and 210 feet above the 725 level.

**WEST YELLOW JACKET.**—Timbering the northwest drift, and putting in a track. Are in about 30 feet on the ledge, or a little less. The superintendent expects to get a body of ore when this point is reached.

**ORST.**—Are working 15 men and hoist from 5 to 12 tons of ore daily, which is being reduced at the Briggs mill. Have fully \$65,000 worth of ore in sight. A horn assay made yesterday went up in the thousands.

**KEYES.**—Water coming in the winze on the 230 level, have stopped that work and commenced sinking the shaft with the intention of crosscutting to the ledge and upraising. There is no water in the shaft to hinder the work.

**YELLOW JACKET.**—Are shipping daily to the Santiago mill 90 tons of gold-bearing white rock. Are opening out the 800 and 900 levels, with the view of prospecting the country between the Yellow Jacket and Imperial shafts.

**CROWN POINT.**—The 600 level east crosscut advanced 35 feet during the week, through about the same character of ground as encountered in last report. Have started a southeast drift from the 700 station to connect under the 600 crosscut.

**ENCINEQUER.**—On the 122 level the northwest drift is out 99 feet; the face is in quartz. On the 222 level the east crosscut is out 167 feet. The face is in clay. On the 382 level the north drift is out 50 feet north of the north drift of the Alpha. The face is in clay and quartz.

**CONFIDENCE.**—The north drift on the 1000 level is in 40 feet, having been advanced 31 feet during the week. The joint Challenge-Confidence raise on the 1300 level is up 67 feet, 17 feet having been added during the week. Are shipping daily to the Brunswick mill 190 tons of ore, the battery assays of which average \$35.53 per ton.

**CHOLLAR.**—The south drift on the 650 level is in 170 feet. The face is in quartz. North drift No. 2 is in 133 feet. The face is in porphyry. The south-west drift is in 89 feet. The face is in clay and porphyry. The north drift on the 550 level is in 472 feet. The face is in low-grade quartz. The north drift on the 450 level is in 538 feet. The face is in quartz averaging \$20 per ton.

**HALE AND NOCKROSS.**—Since last report we hoisted 3216 tons of ore from the 600 and 700 levels, and have shipped 1976 tons to the Mexican mill, and 952 tons to the Nevada mill. The average battery assays have been \$34.36 per ton. All the stops throughout the mine are looking very well. We have bullion on hand and previously shipped for the month of May, amounting to \$168,685.97.

**GOULD AND CURRY.**—El Dorado Level: The southeast drift started from the end of the main southwest drift has been advanced 43 feet. The formation is quartz, giving low assays. Drain Tunnel Level: The northwest drift has been extended 27 feet; total length, 100 feet (stopped). During the week there has been extracted from the 250 and 300 levels, and shipped to the Douglass mill 253 tons and 1900 pounds of ore, the average battery assay of which is \$24.18.

**SAVAGE.**—On the 400 level we are stoping ore from the north and south drifts. On the 500 level the west drift was extended 49 feet and the south drift from the top of 600 level upraised 41 feet, and connection made between these drifts. This connection greatly improves the ventilation of the mine, and enables us to do important prospecting on this level. On the 800 level we are extending our south drift. The face is in a promising body of quartz, which gives some good assays. We are also extending the south drift on the 950 level. We are extracting about 80 tons of ore per day from between the 400 and 900 stations. Since last report have shipped to the Rock Point mill 1075 tons, battery samples averaging \$24 per ton. We have bullion on hand and previously shipped for May amounting to \$40,000.

#### Eureka District.

**ORE SHIPMENTS.**—Eureka Sentinel, June 9: The following number of tons of ore were shipped from the mines of the district to the furnaces during the week: Oriental & Belmont, 5½ tons; Whippoorwill, 26½ tons; Dunderberg, 35½ tons; Eureka Tunnel, 16½ tons; Prospect Mountain Tunnel, 8½

tons; White Pine, 4¼ tons; Featherstone, 3¼ tons; Rocky Point, 12 tons; Debris, 3½ tons; Pennsylvania, 1½ tons and Pat McTigh, 8¼ tons. From the Rives & Berry, 23 tons; Leonie, 11 tons; General Lee, 14 tons; Woodchopper, 26 tons and Marguerite, 2 tons.

**A GOOD PROSPECT.**—Joe Molino, the Laird Bros. and Giles Weller, who have a lease of the Wide West mine on Adams Hill, have run a tunnel 270 feet long and raised and drifted from it about 100 feet. This work has been going on for three months, and the openings are in excellent ground for ore, which, in fact, carries rich ore in various places in small seams and vugs. In one place a cave occurred where the ore shows in considerable quantity, but the ground has to be cribbed and timbered to hold it up, and more of the same kind of work will be needed before any amount of exploration can be carried on. The prospect for a paying yield of ore is very good.

#### Tuscarora District.

**BELLE ISLE.**—Tuscarora Times-Review, June 9: Drift north on the 250-foot level has been advanced 15 feet; total, 153 feet. Continues to look favorable.

**NORTH COMMONWEALTH.**—The shaft has been sunk to a depth of 67 feet, passing into the footwall of the vein at about 45 feet.

**NAVAJO QUEEN.**—Southwest drift on ledge from north crosscut, 200-foot level, advanced 15 feet. Face looking very favorable.

**DEL MONTE.**—The drift from the tunnel has been extended 33 feet; total length, 141 feet. No change in the size of the vein or grade of ore.

**NAVAJO.**—South drift, 350-foot level extended 29 feet. South drift from No. 4 crosscut has been advanced 13 feet. Winze, east vein, 250-foot level, has been sunk 45 feet. A drift has been started south at this point.

**GRAND PRIZE.**—On the 200-foot level the west drift has been advanced 12 feet; the ore in the face is not so wide as last reported, but is of fair grade. North crosscut from this drift is advanced 15 feet. Have cut through a vein of low grade ore.

**NORTH BELLE ISLE.**—Fair progress has been made with all the work in and about the mine. The usual output of ore has been made from the different levels. Winze from the 300-foot level has been sunk 24 feet, developing two feet of very high-grade ore.

**FOUND TREASURE.**—Northwest drift has been extended 15 feet, total, 45 feet. The face of the drift is showing small seams of staphanite and ruby ore. Crosscut No. 2 has been extended 10 feet, and has crossed a vein of low-grade, disintegrated quartz averaging from 18 inches to 2 feet in thickness, and carrying kidney-shaped bunches of high-grade ore in places.

**NEVADA QUEEN.**—Work of putting in timbers on the 350-foot level is progressing favorably, and has exposed very fine ore both north and south. The chute in the upraise is being put in and straightened so as to make a clear opening from the 200 to the 300-foot level. Considerable ore has been extracted during the week in doing the above work. Car samples average \$251 per ton.

**COMMONWEALTH.**—On the 100-foot level, east crosscut drift south has been extended 24 feet, passing into the same formation as that carrying the ore on the 150-foot level south drift. The drift, from upraise north of shaft, 150-foot level, being run to connect with raise from east crosscut, has connected the two, thus giving good air in east crosscut, 150-foot level. Ore extracted from this drift gives an average assay of \$551 per ton. The east crosscut from north drift, 150-foot level, has been advanced 18 feet, and cut into low-grade ore, assays ranging from \$40 to \$113 per ton. Upraise from 150-foot level to connect with north intermediate drift has been connected, chute has been put up, and work of pushing the intermediate drift north will be started, there being good ore in the face; 150-foot level south drift has been extended 19 feet. The drift has been all in good ore, and looking well in the face. There is no hanging or footwall in sight, and cannot tell how much of an ore body there is. Have followed this ore 190 feet since first showing in the drift. Car samples of all second-class ore hoisted for the week, average \$464 per ton; average of concentrating ore, \$51.

#### ARIZONA.

**EUREKA DISTRICT.**—Prescott Courier, June 9: Colonels Wilson and Smith and Messrs. Rybon and Waters own fine ledges in Eureka district that are certain to become fine mines. From several careful assays and samples, they are satisfied that the ore from these ledges will yield from 45 to 47 per cent lead and from 15 to 104 ounces silver per ton. Very little work has, as yet, been done upon these ledges, so that the results are from top rock. Col. Wilson, who has experience in mines in many States and Territories, also in Mexico, has gone down to superintend development work, sorting and shipping ores. The ledges are near the Hillside mine and the Lawler copper mines.

**BRADSHAW.**—Veins in the four tunnels of the Oro Bonita and Oro Bella mines, Bradshaw district, are from 20 inches to 3 feet wide, and average samples are \$54.30, \$73.80 and \$106.75 gold.

**GROOM CREEK.**—Standard mill, Groom creek, six miles south of Prescott, is working ore from the Adel mine. We had the yield, lost it, but remember that it was good. The ore can be assorted so as to mill over 200 ounces of silver.

**TURKEY CREEK.**—A gentleman who is working a claim on the Goodwin mine, Turkey Creek district, says he recently shipped ore that yielded 4600 ounces of silver to the ton. George Zika has arrived from Lower Turkey creek, 30 miles southeast of Prescott. He has there a mine called the Golden Belt. It is a "blanket" ledge and a good one, too. Thirty-eight tons, worked in an astras, by water-power, yielded a trifle less than 50 ounces of gold, also some silver. George has another mine, the Mesa, and an astras on Lower Agua Fria. He recently worked 21 tons of Mesa ore, got 26 ounces gold, 821 fine, worth \$437.56; also \$4.99 in silver. Being a good, steady worker and first-rate man in every respect, the Courier is glad to learn of his success.

**WALKER DISTRICT.**—Owners of the Amulet mine, Walker district, are making regular shipments to the sampling works. Returns of 20 tons of ore shipped to Argo, Colorado, by Dan Hatz, from the

Ruby and Helena Vista mines, Hassayampa district, are \$1387.77, \$10 per ton off for treatment. He is satisfied with the yield, has abundance of such ore and will make regular shipments.

**ORE SHIPMENTS.**—Mohave Miner, June 9: The Oliver Bros. have a shipment of ore from the Sunlight mine on the depot platform. The mill at Cerbat will be started next week. The first run will be made on a lot of low-grade ore. The sampling works have been busy all week, and ore is coming in in such quantities as to keep the works running to their full capacity. The American Flag boys have another carload of rich ore on the way to the sampling works. The American Flag is looking better than ever. T. L. Ayres has made a rich strike in Union Basin. The ledge is reported to be three feet wide and assays from 120 to 252 ounces per ton in silver and from five to ten ounces in gold. There is a probability that the McCracken mine will resume operations before many months. This is the best property in the Territory, and there is now no reason why work should not be resumed. Thos. Eager, superintendent of the Kingman Silver Mining Co., is in town this week. The company has suspended operations temporarily, and arrangements are being made to put on a larger force of men, and a tunnel will be run to the body of ore recently uncovered. The mine will be energetically worked.

#### COLORADO.

**RICH STRIKE AT LEADVILLE.**—Denver Republican, June 8: The Leadville mining district is holding out very satisfactorily, and the daily production is placed at over 1000 tons of smelting ore. While a great many mines contribute to this output, the bulk is probably secured from four or five leading mines. The Maid of Erin and Minnie and A. Y. mines produce about 200 tons a day each. Next come the Adams, the Wolfstone, the Colonel Sellers, the New Year and the Louisville, with yields of 60 to 125 tons a day. A considerable portion of the production of the camp at present is very fair lead ore, and indications point to a greater lead yield during 1888 than was made in the past year. It would prove a difficult matter to make even an approximate estimate of the average value of the Leadville ores. While much of the mineral is of very low grade in silver, there is also a considerable production of high-grade ore, and it is not as easy a matter to strike a general average as it was several years ago. The Leadville district during the week past was favored with a new strike, made in the Pocahontas mine, situated on the northwest skirts of Carbonate hill. The newly opened ore body was encountered at a depth of about 400 feet, and shows a thickness of four feet, the mineral running about 150 ounces in silver to the ton and carrying 50 to 60 per cent in lead. This discovery is one of the most important made in the Leadville district for a long period. The shaft is situated below the Carbonate and Penderly faults, the line beyond which nothing had so far been discovered. It opens up a comparatively new area, of vast extent, and is almost certain to lead to other work that will be followed at no distant day by the exploration of the ore horizon under the city of Leadville. The Pocahontas is situated right in the limits of the city, less than ten blocks from the courthouse, and the ore shoot encountered, if maintaining the conventional course, will lead right under the heart of the city. The dip of the vein is to the westward or under the town, but this inclination will probably be changed if the vein is followed for some distance, as was shown in the Star of the West, between the Carbonate and Iron hill faults. The discovery is one of great value to the Wolcott Mining Co., the Orion and other lodes in the vicinity, and to the placer properties on which the eastern half of the city is located.

#### IDAHO.

**THE CINNABAR MINE.**—Challis Messenger, June 5: The Cinnabar mine has been bonded by Messrs. Geo. and Cal. Kirk, the locators and owners, to St. Louis and Illinois capitalists for a large amount of money, and a bonus of \$20,000 has been put up and is on deposit in St. Louis; working capital, \$50,000. The bond is for 90 days. Mr. Cal. Kirk has been selected as general manager by the company, and is to take charge of the property as well as see to the putting in of a large amount of fine machinery. A wagon road is to be built from the mine, down Squaw creek, crossing the Salmon river at the mouth of Squaw creek and connecting with the Slate creek road, about 4½ miles above Clayton. As soon as the road is completed, an air compressor and Burleigh drill will be put in. The compressor will be used for the double purpose of driving the Burleigh and hoisting from the main shaft. The Burleigh is to be used for running a 500-foot tunnel. This tunnel, especially for drainage, is almost an absolute necessity, as the mine heretofore has been very wet. It is also the intention of the company to put in concentrating works. These works are to be built on Squaw creek, near the mine, and are to be completed this season. The company expects to use steam as the motive power. The Cinnabar is situated on Bruno creek, a tributary of Squaw creek, and is about ten miles in a northwesterly direction from Clayton. It is owned, as above stated, by Geo. and Cal. Kirk, the locators. It is developed by a shaft—on the dip of the vein, which is not far from 80 degrees—304 feet deep. This shaft is sunk on the footwall, and from the bottom a crosscut has been driven through the ore 18 feet, not striking the hanging-wall. This 18-foot breast of ore, as developed by the crosscut, samples 43 ounces in silver and 30 per cent lead. No stoping has been done to speak of, and all the ore extracted has been taken out in sinking the 304-foot shaft. Five thousand tons of second-class ore are now on the dump, and owners have realized from the first-class ore, which they shipped to Clayton and Bayshore for reduction, the handsome sum of \$58,000. The Cinnabar is a great concentrating proposition. The ores are silver-lead and carry no sulphurates or chlorides.

**A GOOD OPENING FOR WORKERS.**—Wood River Times, June 1: There is no good reason why any able-bodied miner wanting to work should be idle at this season on Wood River. If he cannot obtain employment as good he can do almost as well, with the chances of doing much better, by leasing a prospect. There are dozens such which have ore in sight, but not enough to pay expenses if worked by days' work, which would prove bonanzas to industrious and competent miners. Let them take leases.

To be sure, the returns are not as reliable as if one were working for wages, but a leaser is liable to make a fortune in a short time. We have no doubt that, if the facts were known, it would be demonstrated that leasers have so far realized more profits from our mines than the owners have. Wood River offers more and better opportunities for poor men to-day than it ever did.

#### MONTANA.

**THE CAPITAL MINE.**—Butte Miner, June 8: The Capital mining property situated six miles west of Helena is creating a great deal of talk at present in mining circles. The facts about the mine, as near as can be ascertained, are that the lead has been opened to view about 50 feet from the surface, showing a ledge about six feet wide. The hanging-wall is well defined, and a seam of 2½ feet of the ledge adjoining said wall has averaged \$1500 per ton. The remainder of the lead is composed of boulders which have thus far averaged between \$50 and \$80 per ton. The ledge is well defined for a distance of 2000 feet, and assays of the croppings have shown \$12 per ton. Mr. H. E. Owen, who has just returned from there, says that the opinion in Helena is that the property is an exceedingly good one. He was accompanied to the mine by Geo. H. Babcock, one of the most prominent mining men of the Territory, who pronounced it the best gold property he had ever seen, considering the amount of development upon it. From all that can be learned by our reporter the universal opinion as expressed by prominent experts is that the Capital mine will be one of the principal mines in the Territory.

**ELKHORN DISTRICT.**—Montana Mining Review, June 9: The Dunstone mine is now opened by a shaft 65 feet deep, and shows a remarkably fine body of ore. Fully four feet of solid galena is now exposed, and its quality is improved since the last reported assays. About 100 tons of ore are already on hand, and not less than 300 tons are in sight, as ordinarily estimated. Should the ore prove to be no better than that formerly tested it will sell for about \$100 per ton at the dump.

**THE RELIEF.**—Considerable water is coming into the 200-foot level of this mine. It is reported that ore has been reached, and an extra boiler and a pump have been ordered for the purpose of keeping the water under control.

**THE UNION.**—A 400-foot tunnel has been driven into this lode along the footwall and for nearly the entire distance within sight of good ore. A shaft 80 feet deep connects with the tunnel at a point 154 feet from its mouth. Continuing 57 feet below the tunnel, good ore was encountered, and a level from this depth was run along the vein about 90 feet with good prospects all the way, but the flow of water was in excess of the hoisting capacity of the windlass and bucket and work in that part of the mine has been abandoned for the present. An excellent pay streak of about two feet thickness is now in the breast of the tunnel.

**THE JAMES R. KEENE** is developed by a shaft 400 feet deep and is equipped with a steam hoist. The adjoining mine, the Elkhorn Mining Co.'s Hotter lode, is pumped to such a depth as to drain the Keene most effectually. A tunnel in 250 feet shows a pay streak, somewhat irregular, but carrying rich ore, which improves in its character and quality as progress is made into the hill. Several carloads of this high grade output is now on the dump, assays of which average about \$250 per ton. Considerable activity is now manifested among the miners of Elkhorn.

#### OREGON.

**SALE OF MINING PROPERTY.**—Bendrock Democrat, June 9: An interest in the Herculean mine on Cracker creek has been sold to Eastern capitalists, for we learn a handsome consideration. Development work will be continued under the new management with diligence. The Herculean as the property of D. C. Probasco and Fred Huntington has produced some very rich ore and is recognized as one of the best mines on Cracker creek.

**FROM CORNUCOPIA.**—Messrs. H. Webb and E. P. Torrey have returned from the Pine creek mines, where they spent the past couple of weeks making experiments on ore from the Companion mine, working the same in the Hope mill. These experiments have proven quite satisfactory, so we are informed.

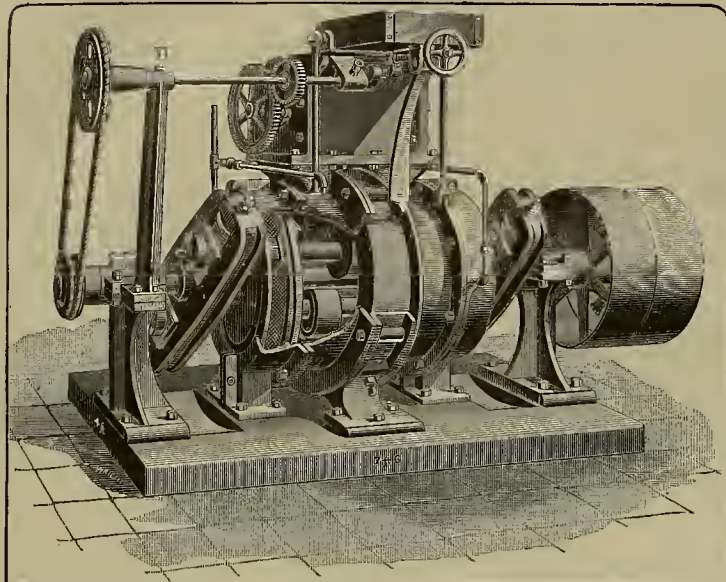
#### UTAH.

**REVIEW.**—Salt Lake Tribune, June 8: The current week closed the first five months of the year. The receipts for these five months have been reported as follows: January, \$327,141.43; February, \$285,687.79; March, \$283,263.98; April, \$224,019.60; May, \$385,725.14; total, \$1,505,847.94. This of course is not the total production; it excludes all ores shipped, and does not include such producers as make annual reports only. The week has been a quiet one, with a good deal of discouragement on account of the low price of silver and lead. A few mines have shut down, others are storing their ore in place of selling it, and all mine managers are much irritated at the Treasury rulings that admit Mexican lead ores free of duty, this influx being considered chiefly responsible for the present bad condition of the lead market. The receipts in this city for the week ending June 6, inclusive, were to the value of \$86,199.05, of which \$46,668.33 was ore and \$39,530.72 was bullion. For the previous week the receipts were \$61,949.56 in bullion and \$59,440.07 in ore. The Ontario product for the month of May was, of bullion, 98,366.71 fine ounces; ore sales, \$68,337.36; total, \$166,704.07. For the week it was from ore sales, \$10,820.73. The daily output for May was 72,659.37 fine ounces of bullion, \$14,318.85 from ore sales, an approximate total of \$86,977.72. For the week it was \$7740.22 from ore sales. The daily paid on the 31st its regular bi-monthly dividend of 50 cents per share, or \$75,000, being dividends Nos. 14 and 15. Fine bars, valued at \$11,354.54 were received during the week. The product of the Hanauer smelter for the week was \$19,105 in bullion; of the Germania, \$9074.18 in bullion. Ore receipts in this city for the week were \$16,420 by Wells, Fargo & Co.; \$23,750 by McCormick & Co.; and \$6498.33 by T. R. Jones & Co. The Horn Silver still makes no showing, though it is understood in a general way that it is not altogether idle.



## FRISBEE WET MILL.

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.

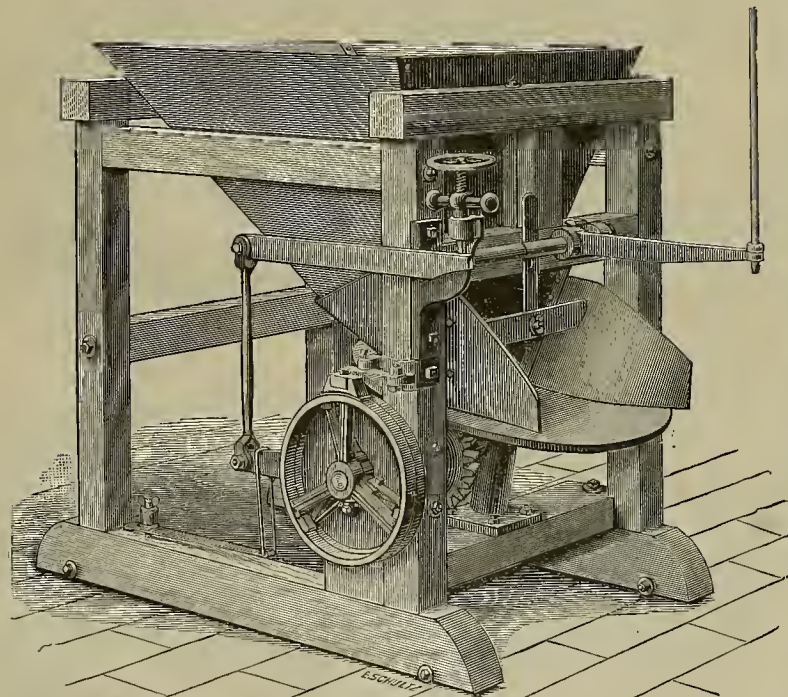
OUR DRY MILLS are the most economical ever built, and are extensively used with record of several years. No grinding in pans. Mill finishes to any fineness desired.

### FRISBEE-LUCOP MILL COMPANY,

GIDEON FRISBEE, Manager, - - - 461 Howard St., San Francisco  
HOOKER & LAWRENCE, Gen'l Ag'ts, 145 Broadway, New York.

## JOSHUA HENDY MACHINE WORKS,

Nos. 39 to 51 FREMONT STREET, SAN FRANCISCO, CAL.



### "HENDY" IMPROVED "CHALLENGE" ORE FEEDER.

The best form of Feeder ever devised, and pronounced by reputable mining men to be far superior to any form of "Roller" Feeder manufactured. We refer to the following gentlemen who have furnished us with testimonial letters to the above effect, which can be seen at our office, viz.:

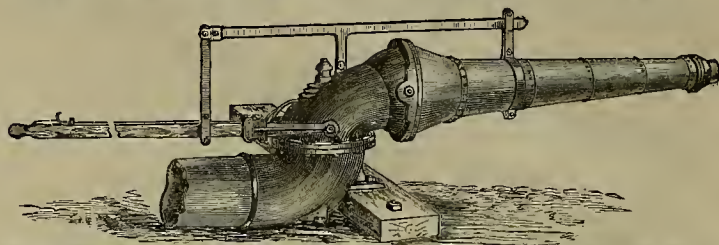
H. W. CROCKER, Supt. Bunker Hill Gold Mining Co., Amador City, Cal. D. C. WICKHAM, Taylor Mine, Greenwood, Cal.  
W. G. ROBERTS, Greenwood, El Dorado Co., Cal. J. R. TREGLOAN, Supt. South Spring Hill Gold Mining Co., Amador City, Cal.

WE ARE MANUFACTURERS OF THE

"CHALLENGE," "STANFORD," "TULLOCK," & "ROLLER" FEEDERS,

And will furnish descriptive Catalogues and quote prices upon application.

## IMPROVED FORM OF HYDRAULIC GIANTS.



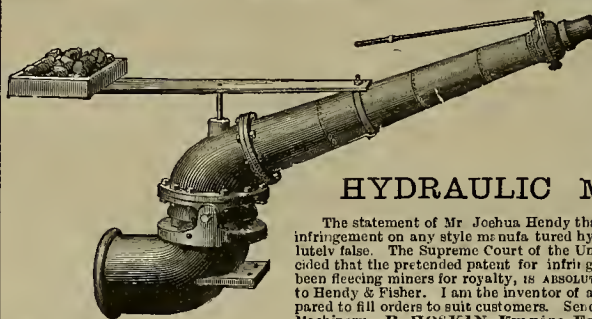
The above cut illustrates the **IMPROVED FORM OF DOUBLE-JOINTED HYDRAULIC GIANTS**, with lever attachment, which we manufacture. All similar styles are infringements upon this form, and a judgment stands of record to that effect, under a decision of Sawyer, Judge of the U. S. Circuit Court, in the case of Hendy and Fisher vs. R. Hoskin et al.

We also manufacture the **Single-Jointed Giants**.

Prices and Catalogues of Hydraulic Mining Machinery furnished upon application.

JOSHUA HENDY MACHINE WORKS,

39 to 51 Fremont St., San Francisco, Cal.



## HOSKIN'S

IMPROVED

ONE-JOINTED

HYDRAULIC MACHINE.

The statement of Mr. Joshua Hendy that any style of machine is an infringement on any style manufactured by him, he knows to be absolutely false. The Supreme Court of the United States on March 19th decided that the pretended patent for infringing, which he has for years been fleeing miners for royalty, is ABSOLUTELY void, with costs of suit to Hendy & Fisher. I am the inventor of all styles in use, and am prepared to fill orders to suit customers. Send for list of prices of Hydraulic Machinery. R. HOSKIN, Empire Foundry, Marysville, Cal.



## ARE YOU GOING TO PUT UP MACHINERY OF ANY KIND?

Are you going to make any change in machinery? Are you freighting by team or packing on mules? Do you want Pulleys on Shafting already up? If so, don't fail to look into the merits of

## THE DODGE PATENT INDEPENDENCE WOOD SEPARABLE OR SPLIT PULLEYS.

They are the Lightest, Strongest, Best Balanced and Most Convenient Pulleys Made in the World.

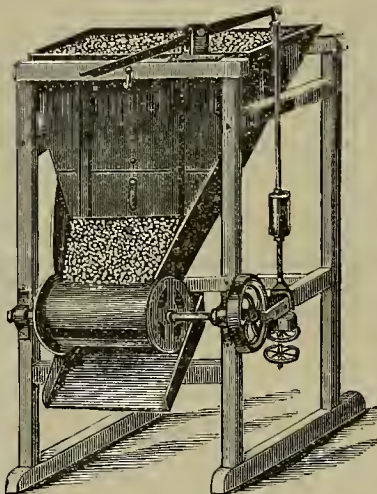
Entirely new and original. Adapted to any power required. Time, trouble and money saved by using these pulleys. Also Agent for the DODGE SYSTEM OF ROPE TRANSMISSION. Estimates furnished.

Price List and Catalogues mailed free.

JOHN SIMONDS, Pacific Coast Agent, 509-513 Mission St., S. F.

## THE ROLLER ORE FEEDER

(Patented May 28, 1882.)



This is the best and cheapest Ore Feeder now in use. It has fewer parts, requires less power, is simpler in adjustment than any other. Feeds coarse ore or soft clay alike uniformly, under one or all the stamps in a battery as required. In the Bunker Hill Mill it has run continuously for two years, never having been out of order or costing a dollar for repairs.

Golden State and Miners' Iron Works,  
Sole Manufacturers,  
827 First Street, San Francisco, Cal.

## CLAYTON AIR COMPRESSORS,

For Working

Rock Drills, Coal Cutters, Hoisting Engines and Water Pumps in Mines and Tunnels, Sinking Caissons, Elevating Acids, Transmitting Natural Gas, Atomizing Petroleum, &c For Catalogues, Etc., address,

Clayton Air Compressor Works,  
43 DEY ST., NEW YORK.

BACK FILES of the MINING AND SCIENTIFIC PRESS (unbound) can be had for \$3 per volume of six months. Per year (two volumes) \$5. Inserted in Dewey's patent binder, 50 cents additional per volume.

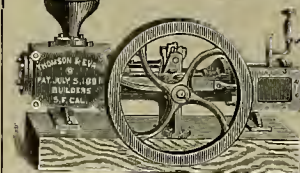
## C. H. EVANS

(Successor to THOMSON & EVANS),

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MACHINE WORKS,

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DEEP WELL PUMPS.

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SAW MILLS AND MACHINERY of all kinds made to order. Send for Descriptive Catalogue. 17 and 19 Fremont St., San Francisco.

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This Fire-proof Brick Building is centrally located, in the healthiest part of the city, only a half block from the Grand and Palace Hotels, and close to all Steamboat and Railroad Offices.

Laundry Free for the use of Families  
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Terms, Board and Room, \$1.00 per Day

And upward.

ROOMS WITH OR WITHOUT BOARD.

FREE COACH TO THE HOUSE  
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## San Francisco Cordage Factory.

Established 1856.

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc.

Extra sizes and lengths made to order on short notice

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611 and 613 Front St., San Francisco.



**STURTEVANT MILL.**

This Mill as a Crusher and Pulverizer is without rival.  
Is in operation in each  
ing smelting works  
and mills.

SEND FOR CATALOGUE AND TESTIMONIALS.

**MACHINERY for SYSTEMATIC MILLING, SMELTING, and CONCENTRATION of ORES.****PUMPING****ENGINES**

—AND—

**MACHINERY,****CORNISH****PUMPS.**

GENERAL OFFICE AND WORKS:

Fulton and Union Streets, Chicago, Ill.

NEW YORK OFFICE:

Room 43, No. 2 Wall Street.

UTAH OFFICE—SALT LAKE CITY, UTAH.

DENVER OFFICE:

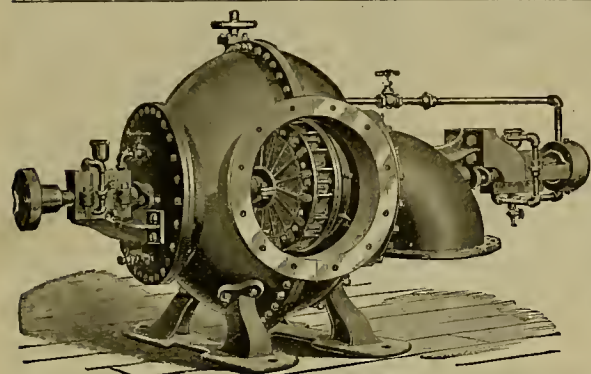
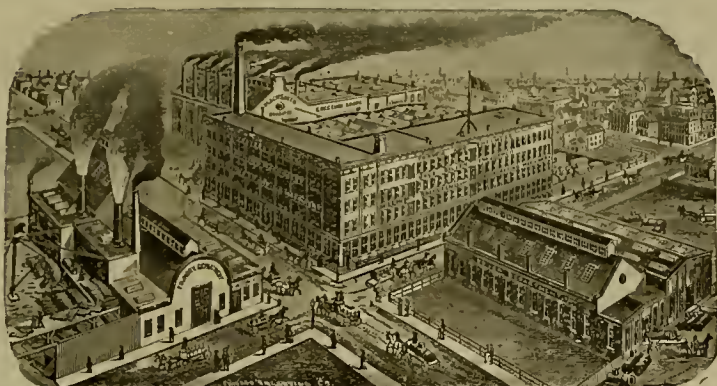
No. 248 Eighteenth Street, Denver, Colorado.

MEXICO OFFICE:

No. 11 Calle de Juarez, Chihuahua, Mexico.

**FRASER & CHALMERS,  
MINING MACHINERY,****ENGINES AND BOILERS.****Huntington Centrifugal  
QUARTZ MILL.**

SEND FOR CATALOGUE

**CORNISH ROLLS,****JIGS and TROMMELS.****HOISTING****ENGINES,****HALLIDIE'S****WIRE ROPE****TRAMWAYS.****JAMES LEFFEL'S  
Mining Turbine Water Wheel.**

These Wheels are designed for all purposes where limited quantities of water and high heads are utilized, and are guaranteed to give more power with less water than any other wheel made. Being placed on horizontal shaft, the power is transmitted direct to shafting by belts, dispensing with gearing.  
Estimates furnished on application for wheels specially built and adapted in capacity to suit any particular case.  
Further information can be obtained of this form of construction, as well as the ordinary Vertical Turbines for Wooden Penstocks and in Iron Globe Cases, free of cost, by applying to the manufacturers.

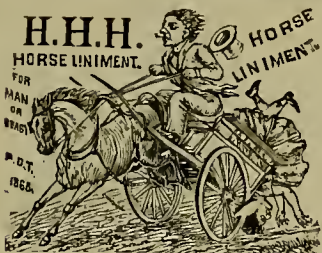
**JAMES LEFFEL & CO.,**

Springfield, Ohio,

or 110 Liberty St., New York.

FRASER & CHALMERS, General Agents,  
Chicago, Ill., and Denver, Col.

PARKE &amp; LACY, General Agents, San Francisco, Cal.



**H.H.H. HORSE LINIMENT.**  
FOR MAN OR BEAST.  
P.O.T. 1868.  
THE H. H. H. Horse Liniment puts new life into the Antiquated Horse! For the last 14 years the H. H. H. Horse Liniment has been the leading remedy among Farmers and Stockmen for the cure of Sprains, Bruises, Stiff Joints, Spavine, Windgalls, Sore Shoulders, etc., and for Family Use is without an equal for Rheumatism, Neuralgia, Aches, Pains, Bruises, Cuts and Sprains of all characters. The H. H. H. Liniment has many imitations, and we caution the Public to see that the Trade Mark "H. H. H." is on every Bottle before purchasing. For sale everywhere for 50 cents and \$1.00 per Bottle.

For Sale by all Druggists.

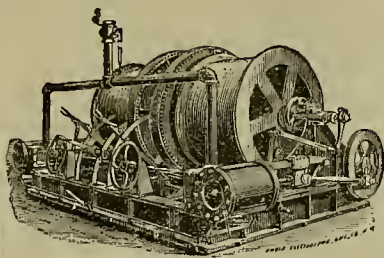
**HOISTING ENGINES  
FOR MINES.**

1, 2, or 4 Drums, with Reversible Link Motion or Pat. Improved Friction.

MADE ONLY BY THE

**LIDGERWOOD M'F'G COMPANY,**  
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PACIFIC COAST AGENTS,

**PARKE, LACY & CO.**  
SAN FRANCISCO.**THE GIANT POWDER COMPANY**

Manufacture Three Kinds of Powder, which are acknowledged by all the Great Chemists of the World as

**The Safest and Strongest High Explosives in the Market.****GIANT POWDER or DYNAMITE,**

Of Different Strengths as Required.

**NOBEL'S EXPLOSIVE GELATINE,** which contains 94 per cent of Nitro-Glycerine, and **GELATINE-DYNAMITE,** Stronger than Dynamite and even Safer in Handling.**JUDSON POWDER IMPROVED.****FOR RAILROADS AND LAND CLEARING.** Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.**BANDMANN, NIELSEN & CO.,**

CAPS and FUSE for Sale

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**CHEMICAL LABORATORY,****BULLION ROOMS and ORE FLOORS,**

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COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed of in the Open Market to the Highest Bidder.

**Metallurgy and Ores.****SELBY****SMELTING and LEAD CO.**

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**GOLD AND SILVER REFINERY  
And Assay Office.**

Highest Prices Paid for Gold, Silver and Lead Ores and Sulphurets.

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Standard Shot-Gun Cartridges,  
Under Chamberlin Patent.**JOHN TAYLOR & CO.,**

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GISTS' GLASSWARE AND SUNDRIES, ETC.**

63 &amp; 65 First St., cor. Mission, San Francisco.

We would call the attention of Assayers, Chemists Mining Companies, Milling Companies, Prospectors, etc., to our full stock of Balances, Furnaces, Muffles, Crucibles, Scoffers, etc., including, also, a full stock of Chemicals.  
Having been engaged in furnishing these supplies since the first discovery of mines on the Pacific Coast, we feel confident from our experience we can well suit the demand for these goods, both as to quality and price. Our New Illustrated Catalogue, with prices, will be sent on application.

Our Gold and Silver Tables, showing the value per ounce Troy at different degrees of fineness, and valuable tables for computation of assays in grains and grammes, will be sent free upon application. Agents for the Patent Plumbago Crucible Co., London, England. Also for E. O. DENVER'S Silver Plated Amalgam Plates. The plates of this well-known manufacturer are thoroughly reliable, and full weight of Silver guaranteed. Orders taken at his lowest prices.

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Near First and Market Streets, S. F.

C. A. LUCKHARDT, Manager.

ESTABLISHED 1890

Ores worked by any Process.

Ores Sampled.

Assaying in all its Branches.

Analyses of Ores, Minerals, Waters, etc.

Working Tests (practical) Made.

Plans and Specifications furnished for the most suitable Process for Working Ores.

Special attention paid to Examinations of Mines; Plans and Reports furnished.

**C. A. LUCKHARDT & CO.,**

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**METALLURGICAL WORKS.**

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Corner of Leldesdorf Street, . . . SAN FRANCISCO

Ores Sampled and Assayed, and Tests made by my Process.

Assaying and Analysis of Ores, Minerals and Waters.

Mines Examined and Reported on.

Practical Instruction given Treating Ores by improved processes.

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One door from Bank of Cal.Rates \$1, \$1.50 & \$1.50 per  
day. Free Coach.

The above Hotel is situated in the midst of the Banking and Commercial Houses of the city, and is by far the most home-like and desirable Hotel to stop at.  
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**THE RUSSELL PROCESS COMP'Y.,****C. A. STETEFELDT, President.**NEW YORK OFFICE, 18 BROADWAY  
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FOR SEVENTY-FIVE DOLLARS THIS College instructs in Shorthand, Type Writing, Book-keeping, Telegraphy, Penmanship, Drawing, all the English branches, and everything pertaining to business, for six full months. We have sixteen teachers, and give individual instruction to all our pupils. Our school has its graduates in every part of the State.

SEND FOR CIRCULAR. E. P. HEALD, President.  
C. S. HALEY, Secretary.

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**PACIFIC Business College,**  
320 POST ST. SAN FRANCISCO.  
1868. 1888.

LIFE SCHOLARSHIPS, \$75.  
NO VACATIONS. DAY AND EVENING SESSIONS.  
Ladies admitted into all Departments.  
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## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 220 Market St., S. F.

FOR WEEK ENDING JUNE 5, 1888.

- 384,119.—BOILER-FEEDER—A. Blatchley, S. F.  
 384,124.—ELEVATED CABLE AND CAR PROPELLER—H. Casebolt, S. F.  
 384,136.—GATE—John Donnelly, San Mateo, Cal.  
 384,050.—HYDRAULIC PUMP—J. H. Martin, Oroville, Cal.  
 384,171.—EASEL—E. R. Morris, S. F.  
 383,976.—ROTARY VALVE—Jas. O'Donnell, S. F.  
 383,977.—GRINDSTONE HANGER—D. O'Leary, San Bernardino, Cal.  
 383,993.—NECKTIE FASTENER—W. R. Sargent, S. F.  
 383,995.—ROTARY PUMP—O. Seifert, S. F.  
 384,089.—CARTRIDGE-LOADING MACHINE—Prentiss Selby, Oakland, Cal.  
 383,997.—SIDE-HILL PLOW—A. K. Snodgrass, Ellensburg, Ogn.  
 384,179.—CLOTHES DRIER—E. S. Sutton, Snohomish, W. T.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

GATE.—John Donnelly, San Mateo, No. 384,136. Dated June 5, 1888. This invention relates to certain improvements in gates and wheels or pulleys, by which a sliding reciprocating gate is carried and an elongated chamber or journal-box with guides, within which the pulley shaft, travel or roller, so as to reduce the friction to a minimum, end a means for easily removing the pulley from its box.

ELEVATED CABLE AND CAR PROPELLER.—Henry Casebolt, S. F. No. 384,124. Dated June 5, 1888. This invention relates to improvements in cable-railway propulsion, and as a means for operating the cars, which are running upon a track upon the ground by means of an aerial cable. It consists of a cable supported above the surface of the ground, a mechanism connected with the car, and carrying the grip on tongs, means for picking up the cable and placing it in the grip, means for throwing the cable entirely off, and means for adjusting the position of the grip with relation to the cable together with certain details of construction.

CARTRIDGE-LOADING MACHINE.—Prentiss Selby, Oakland. No. 384,089. Dated June 5, 1888. The feature of this invention is an improved device for crimping the shells after the powder, shot and wade are in place. It consists of a vertically moving stem or spindle, with means for rotating the same, and an arrangement of springs and weighted arms whereby the operation is more perfectly performed. By the construction employed it is possible to bring the crimping down upon the edge of the shell with a gentle and gradually increasing pressure instead of with an abrupt blow. This device is used in connection with the Chamberlin cartridge machine at the Selby Lead Works, where standard cartridges are made in large quantities.

BOILER FEEDER.—Amrose Blatchley, S. F., No. 384,119. Dated June 5, 1888. This invention consists of a hollow wedge-shaped chamber, the smaller end of which is fixed to a hollow pipe or shaft which extends outward through a stuffing-box in the side of the boiler, and water can flow from the boiler through the pipe into the wedge-shaped chamber, when the boiler contains enough for its needs. This increases the weight of the chamber and depresses it so that it acts upon a valve and closes the boiler supply-pipe. When the water falls in the boiler it runs out of the chamber, and by thus lightening it allows it to rise and open the supply passage. The boiler supply is thus automatically controlled.

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco:

SALT LAKE AND LOS ANGELES R. R. Co., June 13. Object, to construct a railroad in Kern, Tulare, Inyo, Mono and Los Angeles counties, Cal., and through Nevada to Salt Lake. Capital stock, \$20,000,000. Directors, Isaac Trumbo, Alex. Badlam, Wm. H. Brown, George Burgess and John W. Creagh.

CALIFORNIA KINDERGARTEN TRAINING SCHOOL, June 1. Object, training and instructing persons wishing to become kindergarten teachers, and the furnishing of assistants to the free kindergartens. The directors are: Kate D. Wiggin, Nora A. Smith, Horace C. Davis, Ira G. Hoitt, Horatio Stebbins, John Swett, William E. Brown, Sarah B. Cooper and Mary W. Kinosaid.

## Mining Share Market.

Mining stocks have been somewhat livelier this week than has been usual of late.

The most important news to announce in the mining situation is the work which has been started on the 800 and 900 levels of Yellow Jacket, with a view to exploring the Imperial, Challenge, Confidence and the northern part of the Yellow Jacket on the 600, 700, 800 and 900 levels. This is the largest section of virgin country on the Comstock lode within the confines of its determined mineral belt. The outlook, therefore, in that portion of the Comstock is very favorable for the finding of bodies of ore of considerable extent. It is proposed to prosecute this work with vigor.

Tuesday's Virginia Chronicle contains the following: When the shrinkage in the river compels the hanging up of a majority of the Eureka mill stamps the California will start 60 of its complement of 80, dropping on Con. Cal. and Virginia ore. The Brunswick mill, where Confidence ore is crushed, is equipped with steam as well as water-power, and with the former as an auxiliary the full complement of its stamps can be kept hammering away steadily the entire year. The 20 additional stamps now being added to the complement of the Chollar mill will be ready to drop early in July, and will supply the place of those hung up in the Mexican, now crushing Hale and Norcross ore. There need, therefore, be no suspension of dividends during the entire year through lack of ore-crushing power in the above trio of mines. The Savage, Yellow Jacket and Overman will be the only mines the bullion product of which will be seriously curtailed this year, through a hanging up of stamps from a shrinkage of the Carson river flow during the dry season. This will result in a curtailment of less than \$60,000 in the monthly bullion yield of the Comstock.

PRACTICAL HINTS FOR DRAUGHTSMEN.—This is the title of a new work by Chas. W. MacCord, professor of mechanical drawing in the Stevens Institute of Technology, published by John Wiley & Sons, New York. The leading object of the treatise is to explain the various modes of representation which are in many cases better than the precise ones of projection; for mechanical drawings often convey false impressions by too close adherence to the truth, and become obscure by being too exact. The subjects treated are: Working drawings defined; rules of projection defined; clearness and certainty the essential requisites; illustrative examples on the representation of bolts, nuts, screws and such; free hand sketching; sketching in proportion; its utility in designing; sketching from measurement; methods of practicing; practical suggestions and examples; drawing instruments and materials; proportion of bolts, nuts, threads, etc., according to the Sellers & Whitworth system. The work is a very valuable one to draughtsmen. The illustrations are good and clear, and the text simple. The retail price of this book is \$2.50.

## San Francisco Metal Market.

WHOLESALE.

THURSDAY, June 14, 1888.

ANTIMONY—French Star.....	9 @ 94
BORAX—Refined.....	7 @ 7
Powdered.....	6 @ —
Concentrated.....	7 @ —
COPPER—	
Sheet.....	26 @ —
Sheathing.....	26 @ —
Ingot.....	26 @ —
Pine Box Sheets.....	26 @ —
Iron—Glencoe No. 1.....	23 @ 20
Glencoe No. 2.....	23 @ 20
Glencoe No. 3.....	23 @ 20
American Soft, No. 1, ton.....	23 @ 20
Clay Line, ton.....	21 @ 23 00
Old Lead White.....	22 @ 20
Shot, No. 1.....	22 @ 20
Bar Iron (base price) per lb.....	21 @ 20
LEAD—Pig.....	5 00 @ 5 12
Bar.....	5 25 @ 5 50
Sheet.....	7 @ —
Black Diamond tool.....	10 @ 20
Pick and Hammer.....	8 @ 8
Machinery.....	6 @ 8
Too Calk.....	4 @ —
TINPLATE—Coke.....	5 75 @ 6 25
Charcoal.....	6 75 @ 7 25
QUICKSILVER—By the flask.....	67 50 @ 33 50
Flasks, new.....	1 05 @ —
Flasks, old.....	85 @ —

## New York Metal Market.

Telegraphic advices dated June 14th give the following New York prices:

BAR SILVER—92c per oz.  
 BORAX—9c.  
 COPPER—LANK—\$16.60.  
 IRON—No. 1, \$22.00.  
 LEAD—\$3.67 1/2 @ —  
 TIN—\$17.90 @ —

The following is the latest by mail from the "New York Metal Exchange Market Report":

COPPER—Dull, closing at \$16.60 @ 16.70. Transferable Notices (Lake) issued at \$15.50 @ —.

LEAD—Quiet, at \$3.50 spot. Transferable Notices issued at \$4.10.

TIN—Nominal at \$18.25 @ —.

Prices generally ruling for metals not regularly dealt in on call at the N. Y. Exchange, covering extremes of buyers' and sellers' views. All prompt delivery. Australian Tin, @ —. Baltimore Copper, \$14.50 @ 15.40. Orford Copper, \$15.50 @ 16.00. P. S. C. Copper, @ —. Foreign Lead, \$4.25 @ 4.50. Foreign Spelter, \$5.50 @ 5.75. Antimony, \$10.50 @ 14.00.

R. KONDO, a wealthy Japanese mine-owner, has been visiting Nevada county, with State Mineralogist Irelan, looking at the mines and mining machinery. He will go to New Mexico, Arizona, Colorado, Idaho and Montana, before returning home. His idea is to examine new mining appliances.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

# ASSESSMENTS.

COMPANY.	LOCATION.	No.	AM'T. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Alta M Co.....	Nevada.....	37..	50, May 12, June 18, July 9,	W H Watson.....	302 Montgomery St	
Arnold M Co.....	Arizona.....	4..	75, May 1, June 4, June 26,	A Judson.....	320 Sansome St	
Balwar Con M Co.....	California.....	4..	20, May 3, June 7, July 5,	L Osborn.....	309 Montgomery St	
Best & Belcher M Co.....	Nevada.....	40..	25, June 5, July 10, July 31,	L Osborn.....	309 Montgomery St	
Bodie Tunnel M Co.....	California.....	15..	25, June 5, July 9, July 31,	C O Harvey.....	303 California St	
Challenge Con M Co.....	Nevada.....	4..	50, May 23, June 23, July 18,	C L McCoy.....	329 Pine St	
Champion M Co.....	California.....	30..	10, May 11, June 18, July 10,	T Wetz.....	322 Montgomery St	
California State Co.....	California.....	1..	10, Apr 18, May 24, June 25,	J O Hanscom.....	401 California St	
Eldred M Co.....	California.....	2..	01, May 23, June 23, July 30,	N A Eldred.....	1533 California St	
Gray Eagle M Co.....	California.....	7..	50, May 1, June 2, June 22,	T Wetz.....	522 Montgomery St	
Golden Prize M Co.....	Nevada.....	1..	25, Apr 21, May 26, June 16,	C D Bennett.....	323 Montgomery St	
Justice M Co.....	Nevada.....	46..	10, June 3, July 11, July 2,	R E Kelley.....	419 California St	
Nye M Co.....	Nevada.....	1..	65, May 23, July 5, July 24,	W J Dorion.....	393 Montgomery St	
Occidental Con M Co.....	Nevada.....	2..	20, May 23, July 2, July 25,	A K Durbin.....	308 Montgomery St	
Paradise Valley M Co.....	Nevada.....	5..	15, Apr 21, May 29, June 18,	A Chemant.....	323 Montgomery St	
Russell Reduction & M Co.....	California.....	2..	10, June 6, July 9, July 31,	J Moritz.....	323 Montgomery St	
Summit M Co.....	California.....	10..	10, June 3, July 11, July 31,	C W Session.....	209 Montgomery St	
Seg Belcher & Mids Con M Co.....	Nev.....	1..	25, June 5, July 9, July 30,	E B Holmes.....	323 Montgomery St	
Southern Cal Coal & Clay Co.....	Cal.....	1, 10, 00,	May 26, June 25, July 26,	W G Muzay.....	10 California St	
Scorpion M Co.....	Nevada.....	25..	10, May 15, June 22, July 16,	G R Spinner.....	309 Pine St	
Tioga M Co.....	California.....	13..	10, May 1, June 5, June 27,	B L Busling.....	309 Montgomery St	
Utah Con M Co.....	Nevada.....	4..	25, May 4, June 8, June 26,	A H Fish.....	303 Montgomery St	

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE
Bodie Con M Co.....	California.....	G W Sessions.....	309 Montgomery St.....	Annual.....	June 15
Confidence S M Co.....	Nevada.....	A S Groth.....	339 Montgomery St.....	Annual.....	June 16
Eureka Con M Co.....	Nevada.....	H R P Hutton.....	306 Pine St.....	Annual.....	June 17
North Belle Isle M Co.....	Nevada.....	J W Pew.....	310 Pine St.....	Annual.....	June 17
Hale & Norcross S M Co.....	Nevada.....	J F Lizaer.....	329 Montgomery St.....	Annual.....	June 17
Oregon Coal & Navigation Co.....	Oregon.....	R B Williams.....	211 Sansome St.....	Annual.....	June 17
Pacific Borax, Salt & Soda Co.....	California.....	A H Clough.....	330 Montgomery St.....	Annual.....	June 11
Standard Con M Co.....	California.....	J W Pew.....	310 Pine St.....	Annual.....	June 12

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.....	Nevada.....	A W Havens.....	309 Montgomery St.....	50.....	June 11
Confidence S M Co.....	Nevada.....	A S Groth.....	339 Montgomery St.....	2.00.....	June 12
Eureka Con M Co.....	Nevada.....	H R P Hutton.....	306 Pine St.....	25.....	June 9
North Belle Isle M Co.....	Nevada.....	J W Pew.....	310 Pine St.....	50.....	June 7
Hale & Norcross S M Co.....	Nevada.....	J F Lizaer.....	329 Montgomery St.....	3.00.....	June 7
Oregon Coal & Navigation Co.....	Oregon.....	R B Williams.....	211 Sansome St.....	1.50.....	Mar 2
Pacific Borax, Salt & Soda Co.....	California.....	A H Clough.....	330 Montgomery St.....	1.00.....	June 11
Standard Con M Co.....	California.....	J W Pew.....	310 Pine St.....	5.....	June 12

## News in Brief.

THE White Star cannery at Astoria was destroyed by fire on Tuesday last.

OVER two-thirds of the saloons in Philadelphia are closed by the Brooke law.

THE spring rodeo having ended, cowboy tournaments are taking place in Arizona.

THE murderers of John Lowell, the wealthy Sacramento farmer, have been captured.

THE records of the Patent Office show that women have obtained patents on 1900 inventions.

A FIRE entailing a loss of \$90,000 occurred in a business block on Broadway, Oakland, on Monday evening.

WOMEN are the State Librarians of Indiana, Iowa, Kentucky, Michigan, Louisiana, Mississippi and Tennessee.

THE price of diamonds has fallen. It was over 22 shillings per carat in October, 1887, and it is now less than 18 shillings.

THE payroll of the Comstock mines for May aggregate \$238,575, of which amount, the Enterprise says, \$30,000 was paid in silver.

THE Santa Paula Chronicle reports the shipment of 184 tank-cars of oil from that place during the month of May, the largest shipment ever made in one month.

A LETTER has been received by the Immigration Bureau at Maryville that a wagon train is being made up in Hickory county, Mo., consisting of 18 families, to cross the plains to Yula county.

A CANAL has been projected along the foothills from a point near Firebaugh's, Fresno county, to Tracy, San Joaquin county, taking water out of the San Joaquin river at the first named place.

NEWS has been received by J. D. Redding, Deputy U. S. Fish Commissioner on this coast, that a carload of selected lobsters for breeding purposes will leave the East for this city some time during the present month.

TWELVE artesian wells are to be holed to furnish water for the Watsonville beet-sugar factory, which will use 2,000,000 gallons daily.

While boring one of these wells a day or two ago a piece of a redwood tree was encountered at a depth of 140 feet.

CLAUS SPRECKLES reiterates the statement that his sugar refinery at Philadelphia will be going within a year, with a daily capacity of 1000 tons, which will be a much larger capacity than any other refinery in the country. The work will be rapidly pushed.

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, terms of subscription, and give it their own patronage, and as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3.00 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already an subscriber, please show the paper to others.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Hale and Norcross (total for May), \$168,685; June 14, \$32,000; Cons. California and Virginia, 9, \$221,874; Savage, 9, \$49,000; Eureka Con. (for May), \$60,000; June 13, \$420,600; Hanauer, 5, \$4400; Germania, 7, \$2127; Hanauer, 7, \$4345; Germania, 8, \$1796.

"PRACTICAL TRAINING."—This is the title of a little work of some 45 pages by Robert Grimshaw. The subject matter was originally delivered as an address to engineers and machinists apprentices, and is now put into convenient form. The writer is the author of Grimshaw's practical catchism on the pump, steam engine, etc.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING May 24.	WEEK ENDING May 31.	WEEK ENDING June 7.	WEEK ENDING June 14.
Alta.....	1.70	2.05	1.60	3.20
Alpha.....	1.10	1.25	1.10	2.25
Andes.....	1.30	1.50	1.10	1.55
Argenta.....	1.10	1.15	1.10	1.25
Belcher.....	4.75	6.00	4.70	6.35
Best & Belcher.....	1.00	1.40	1.00	1.30
Bullion.....	1.40	1.50	1.40	1.20
Baltimore.....	.50	.85	.75	1.10
Belle Isle.....	.60	.70	.50	.85
Bodie.....	2.50	2.65	2.35	2.50
Benton.....	1.75	1.85	1.65	2.00
Bodie Tunnel.....	1.75	1.85	1.65	2.00
Bulwer.....	.70	.65	1.10	.50
Con. Va. & Cal.....	103	11	103	97
Champion.....	5.25	6.50	4.95	10.10
Chollar.....	3.60	4.00	3.50	6.00
Confidence.....	29	32	20	35
Con. Imperial.....	.50	.60	.40	.55
Calderon.....	.40	.50	.40	.30
Con. Pacific.....	.15	.15	.15	.15
Crown Point.....	5.50	6.00	6.00	4.95
Crocker.....	1.15	1.35	1.65	1.85
Central.....	.35	.45	.40	.40
Dand.....	.30	.30	.30	.30
East B. & B.....	.15	.15	.15	.15
Eureka Con.....	9.00	4.60	.97	8.00
Eschquer.....	1.15	1.30	1.05	1.05
North Belle.....	2.15	2.30	2.10	2.15
Gould & Curry.....	4.10	4.30	4.40	4.25
Hale & Norcross.....	7.0	8.00	7.1	7.50
Holmes.....	1.50	1.50	1.50	1.50
Independence.....	1.15	1.15	1.15	1.15
Julia.....	.40	.40	.40	.40
Justice.....	.75	.85	1.40	.55
Kenrick.....	2.25	2.90	2.40	2.25
Lady Wash.....	.35	.40	.35	.30
Marion.....	.40	.40	.40	.40
Mono.....	1.60	1.70	1.30	1.35
Mexican.....	1.10	1.50	1.00	1.25
Mt. Diablo.....	3.50	3.75	3.75	3.75
Northern Belle.....	1.75	1.80	1.75	1.75
Nevada.....	3.90	4.25	3.20	3.30
Niagara.....	3.80	4.15	3.80	3.80
Nev. Queen.....	1.25	1.30	1.15	1.15
North C. & O.....	1.25	1.30	1.15	1.15
Ophir.....	7.50	8.00	7.25	7.00
Overman.....	1.75	2.00	1.65	1.25
Potosi.....	3.55	4.00	3.60	3.25
Perkins.....	2.30	2.65	2.40	2.35
Perr.....	9.00	1.20	.85	.65
P. Sheridan.....	1.00	1.00	1.00	1.00
Silver Star.....	4.55	4.90	4.30	4.50
Savage.....	2.30	2.30	2.30	2.30
Sierra Nevada.....	2.75	4.00	3.80	3.70
Silver Hill.....	.50	.60	.45	.55
Silver King.....	.55	.65	1.00	.50
Scorpion.....	.55	.65	1.00	.50
Santa Paula.....	3.25	3.70	3.30	3.15
Union Con.....	1.35	1.65	1.35	1.10
Utah.....	.50	.60	.45	.55
Yellow Jacket.....	.50	.60	.45	.55


## Sales at San Francisco Stock Exchange.

WEDNESDAY June 13.		300 Justice.....	1.10
180 Alpha.....	1.80	250 Kentuck.....	2.75
600 Alta.....	1.65	100 Lady Wash.....	.35c
300 Andes.....	1.35	650 Mexican.....	4.40
200 Argenta.....	1.50	350 Mono.....	1.60
100 Baltimore.....	2.50	250 N. Belle Is.....	3.15
370 Belcher.....	4.50	200 Overman.....	.85
300 Belcher & B.....	5.50	150 Occidental Con.....	1.25
300 Bullion.....	1.50	100 Peeries.....	2.30
230 Bodie.....	2.40	100 Peer.....	.70c
350 Bulwer.....	.90c	700 Potosi.....	3.55
50 Challenge.....	4.60	100 Silver Hill.....	1.75
700 Collier.....	1.40	370 Savage.....	.75
500 Con.....	1.20	200 Scorpion.....	.75c
500 Crown Point.....	.45c	500 S. B. & M.....	3.00
600 Con. Imperial.....	4.65	215 Sierra Nevada.....	4.10
60 Confidence.....	.21	550 Union Con.....	1.75
300 Exchequer.....	1.25	100 Weldon.....	.65c
600 Exchange & Carry.....	.30	200 Yellow Jacket.....	4.95
375 Hays & Nor.....	50c		
100 Julia.....	.70c		



Machine Drill Steel.

The Sanderson Bros. Steel Co. is now manufacturing a form of drill steel heavier than that formerly made. The little cut given herewith shows the form of this patent machine drill steel. A similar form has been in use on the Comstock and elsewhere for some years, but of two light section for general use. It is a swayed very well for short drills, but for long



Once the vibration was so great as to necessitate its being welded to octagonal bars, using this for the bit or working end. The improved form as here shown, is stronger and has less vibration in use than the octagonal bars.

This steel is made in three sizes, 1 1/2, 1 1/4 and 1 1/8 inch, corresponding with 1 1/2, 1 1/4 and 1 1/8 inch octagon. It costs no more than the octagon bars of same quality of steel, and by its use all the labor and cost, practically, of forging the drills is saved, which is a large item when octagon bars are used, as it has to be forged to this shape by hand. A stock of this steel is carried in San Francisco by the agent H. D. Morris, 220 Fremont St.

Don't Fail to Write.

Should this paper be received by any subscriber who does not want it, or beyond the time he intends to pay for it, let him not fail to write us direct to stop it. A postal card (costing one cent only) will suffice. We will not knowingly send the paper to any one who does not wish it, but if it is continued, through the failure of the subscriber to notify us to discontinue it, or some irresponsible party requested to stop it, we shall positively demand payment for the time it is sent. LOOK CAREFULLY AT THE LABEL ON YOUR PAPER.

A TEA EXPERIMENT IN NEVADA.—It is stated that a prominent land-owner of Elko, Nev., is seeding his ranch to tea. Indian women and children will be employed in gathering the leaves.

DELINQUENT NOTICE.

Butte Creek Hydraulic Mining Company.

Location of principal place of business, 213 Market St., San Francisco, Cal. Location of works, Butte county, California.

NOTICE—There are delinquent, upon the following described stock, on account of Assessment No. 12, levied on the 27th day of March, 1888, the several amounts set opposite the names of the respective Shareholders, as follows:

Names.	No. Certificates.	No. Shares.	Amount.
J. D. Dexter, Tr.....	46	100	5 00
J. D. Dexter, Tr.....	48	100	5 00
J. D. Dexter, Tr.....	49	100	5 00
J. D. Dexter, Tr.....	63	500	25 00
Ed. Dexter, Tr.....	80	500	\$ 25 00
Chas. Moss.....	02	500	25 00
E. Frank Moss.....	90	500	25 00

And in accordance with law, and an order of the Board of Directors, made on the 27th day of March, 1888, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Market street, San Francisco, Cal, on Monday, the 28th day of May, 1888, at the hour of 1 o'clock p. m., of said day, to pay Delinquent Assessments thereon, together with costs of advertising and expenses of the sale.

LOUIS R. LEVY, Secretary.  
Office—213 Market St., San Francisco, Cal.

POSTPONEMENT.

The above sale day is hereby postponed to MONDAY, June 11, 1888, at the same hour and place. By order of the Board of Directors. LOUIS R. LEVY, Secy.

MEETING NOTICE.

Office of the Alabama Mining Company,

Corner of Fifth and Stevenson streets, San Francisco, California, May 12, 1888. Location of works, near Newcastle, Placer county, California.

NOTICE is hereby given to all the Stockholders of said Alabama Mining Company (a corporation) that there will be a general meeting of the Stockholders of said company held at the office of said company at the S. W. corner of Fifth and Stevenson streets, in the city of San Francisco, Cal., on Monday, the 11th day of June, A. D. 1888, at the hour of 1 o'clock p. m., of said day, for the purpose of removing from office the following named Directors of said company, to wit: Owen King, William Reinhold, Samuel Jones and Michael Hoffman, and for the further purpose of filling by election then and there the vacancies that may be caused in the Board of Directors by such removals.

The undersigned is the owner of more than two-thirds of the capital stock of said corporation, as well as a Director and President of said Company, and makes this call under the provisions of Section 310 of the Civil Code.

J. J. SMITH,  
President of the Alabama Mining Company.

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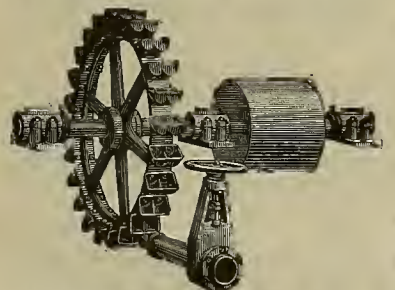


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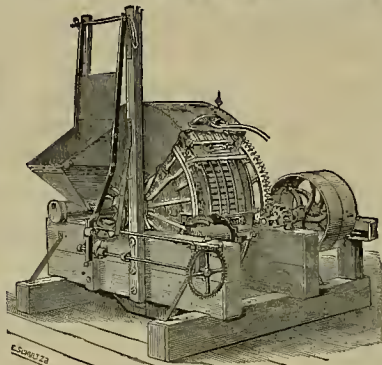
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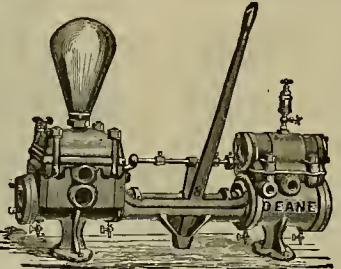
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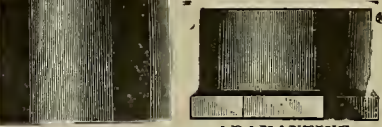
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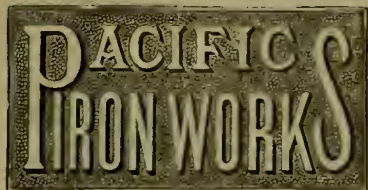
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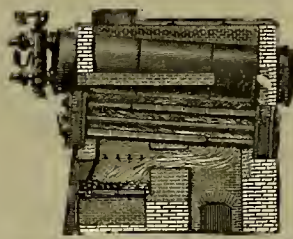
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Besides having the newest and lightest designed small drill plants, the Rand Drill Company, as is well known, has built, and is now building, the largest Compressor plants in this country, and has patterns for all sizes up to 40-inch diameter of cylinder.

In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

Since the reasons which formerly restrained them from the California market no longer exist, they are now in the field for the business.

SPECIAL ATTENTION is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.



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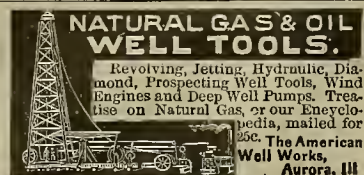
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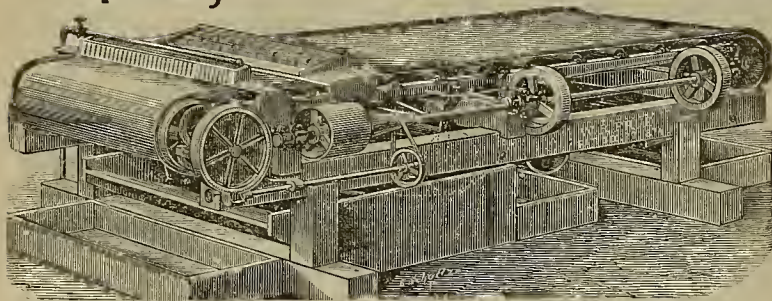


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DEAR SIR:—Having tested three of your Frue Vanners in a competitive trial with other similar machines (Triumph), we have satisfied ourselves of this superiority of your Vanners, as is evidenced by the fact of our having ordered twenty more of your machines for immediate delivery. Yours truly,

THE MONTANA COMPANY (Limited).

N. B.—Since the above was written the 20 Vanners having been started gave such satisfaction that 44 additional Frues and more stamps have been purchased.

ADAMS & CARTER.

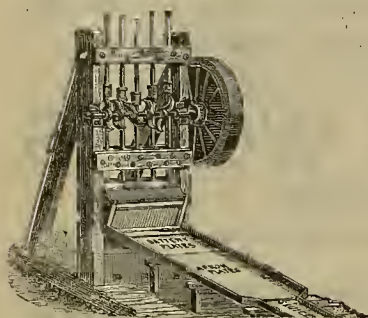
Protected by patents May 4, 1889; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

THE FRUE ORE CONCENTRATOR  
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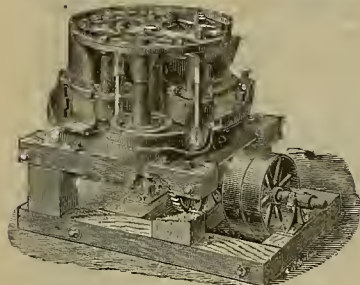
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Centrifugal Roller Quartz Mill.

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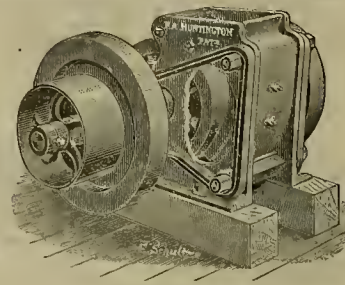
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Centrifugal Roller Quartz Mills,  
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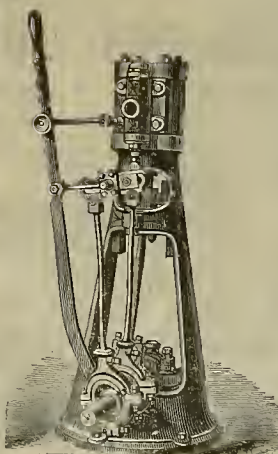
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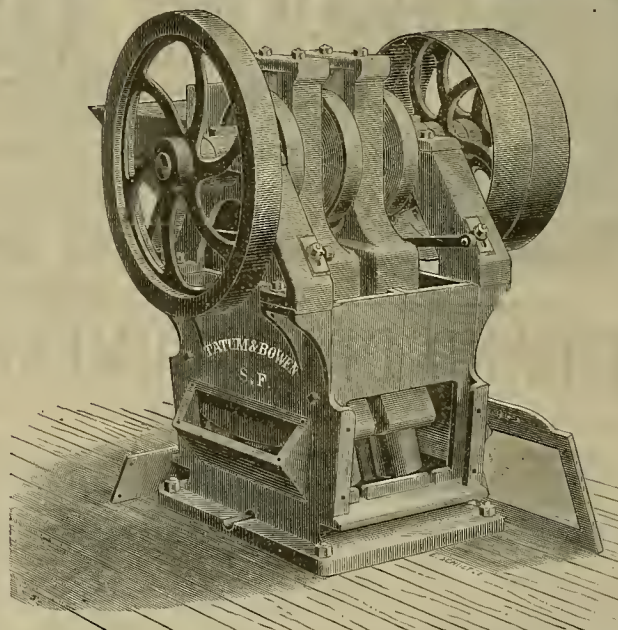
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FROM 2 TO 100 H. P., ALWAYS IN STOCK

MILL SUPPLIES AND LUBRICATING OILS.

## THE DOUBLE "ECONOMIC" STAMP MILL.



We have here the Stamp Mill in a cheap and simple form. The high drop of the old stamp is more than compensated for by the great weight (1200 lbs. each) of our stamps, and the rapidity (300 strokes each per minute) with which they run. There are 4 shoes in each stamp, so that there are 4800 strokes of the shoes on the dies per minute. Less power is required than in any other mill to do the same amount of work.

The Mortar has screens at both ends, giving ample discharge. There are no cams or tappets to wear or be adjusted. The stamps adjust themselves as the shoes wear.

## AN AUTOMATIC ORE FEEDER

Goes with each Mill. We also have a suitable

## Rock Breaker.

Several Mills are now in the mines doing excellent work. The "Economic" is not only a mill for small mines, but we believe it is destined to SUPERSEDE THE OLD STAMP IN MILLS OF THE LARGEST CAPACITY.

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# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

LICK OBSERVATORY EDITION—THIRTY-TWO PAGES.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, JUNE 23, 1888.

VOLUME LV.  
Number 25.

## The Lick Observatory.

### The Largest Telescope in the World.

#### A Description of the Observatory and the Appliances.

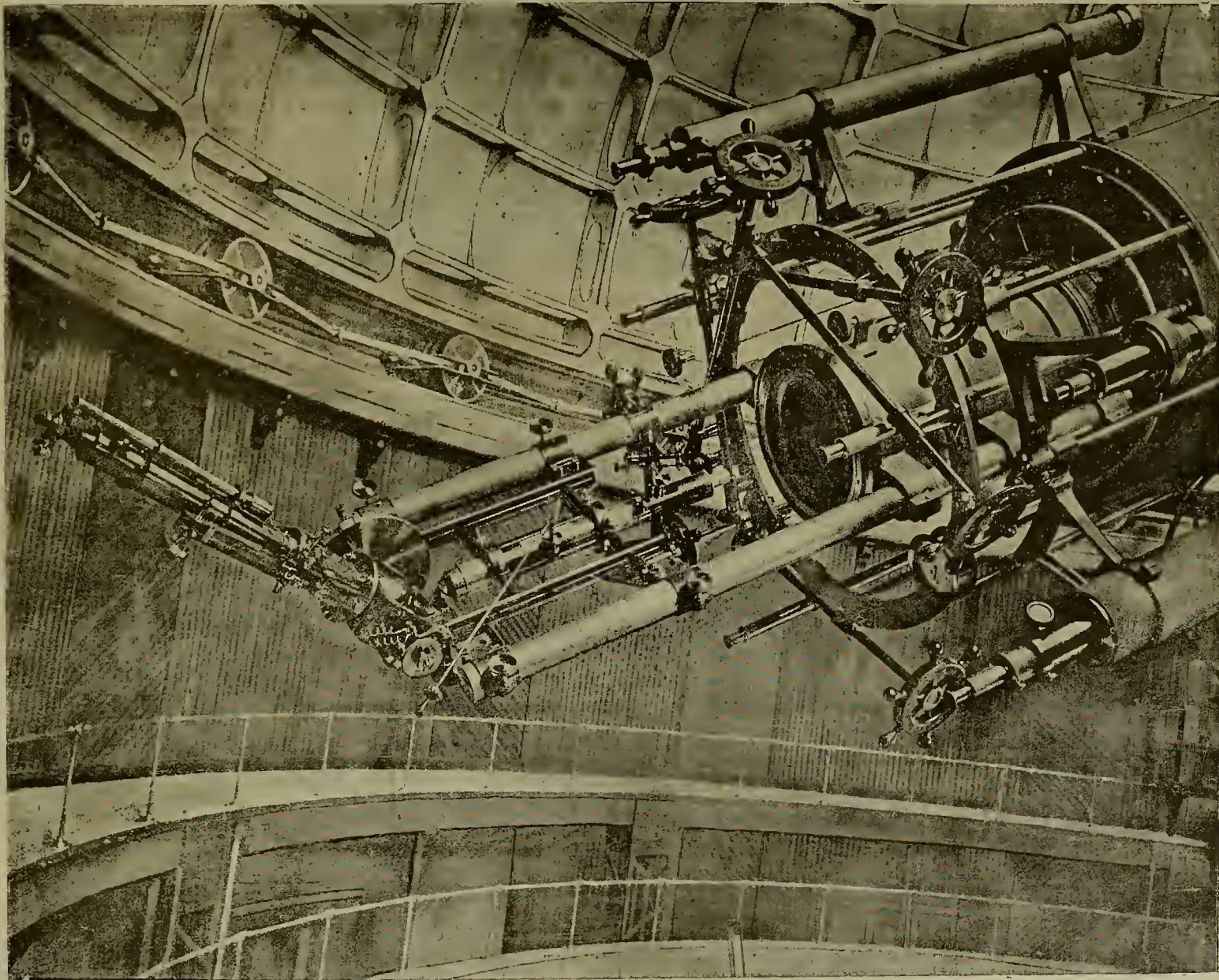
In the deed of trust of the late James Lick,

deed were: Thos. H. Solby, D. O. Mills, Henry M. Newhall, Geo. R. Howard, James Otis, John O. Earl and Wm. Alvord. At that time it was intended to build the observatory on the borders of Lake Tahoe, Placer county, California.

During the summer of 1884, Mr. D. O. Mills

firm. A general plan of the Observatory and an outline of its proper work were submitted to Mr. Mills by Prof. Holden in October, 1874. It was also suggested that no site should be selected and finally accepted by the trustees until it had been astronomically examined by a competent observer. It was proposed that

D. Alhaston, John H. Liok, John Nightengale and Bernard D. Murphy. This Board of Trustees was succeeded by a third board (the present one) under appointments made by James Lick, Sept. 2, 1876, ratified by action of the trustees in session Nov. 29, 1876, and confirmed by action of the courts during the settlement



THE STAR SPECTROSCOPE AND EYE END OF THE TELESCOPE AT THE LICK OBSERVATORY.

dated July 16, 1874, he provided the magnificent sum of \$700,000 for the purpose of constructing a powerful telescope "superior to and more powerful than any telescope ever yet made, with all the machinery appertaining thereto and appropriately connected therewith, or that is necessary and convenient to the most powerful telescope now in use, or suited to one more powerful than any yet constructed, and also a suitable observatory connected therewith." The trustees under this

visited Washington and New York and had frequent consultations with astronomers and others, especially with Professors Newcomb and Holden in Washington, and with Dr. Henry Draper in New York. It was decided that Prof. Newcomb should go to Europe to investigate the matter of procuring the glass necessary for a large reflector or a large refractor. Accordingly he went, in pursuance of a request dated Dec. 3, 1874, and on his return submitted a report detailing his negotiations with several

Mr. Burnham should be asked to visit the various sites in question, and to observe double stars at each of them with the six inch telescope he was regularly using in Chicago. This appeared to be specially important since the topography of the region about Lake Tahoe did not seem favorable to those conditions of steady atmosphere so essential in astronomical work.

Mr. Lick's second deed of trust was dated Sept. 21, 1875, and appointed the following Board of Trustees: Richard S. Floyd, Faxon

of compromises with the heirs of Mr. Lick after his decease. The present Board is composed as follows: Richard S. Floyd, President; Wm. Sherman, Vice-President (died Sept. 12, 1884); Edwin B. Mastick, Treasurer; Charles M. Plum, George Schoenwald.

A further consideration of the proposed site of the observatory at Lake Tahoe led to the conclusion that whatever might be the advantages of the situation, the disadvantages arising from the extremely severe winters would proh-



ably outweigh them. Mr. Lick himself was convinced of this, and had various consultations with Capt. Floyd on this subject. Capt. Floyd advised the examination of some mountain further south. During the summer of 1875 Mr. Lick sent Mr. Fraser, his agent, to report, to Mt. St. Helena, Mount Diablo, Loma Prieta and Mount Hamilton, with special reference to their accessibility and to the convenience of establishing extensive buildings on their summits.

Mr. Fraser's visit to Mt. Hamilton was made in August, 1875. In many respects this seemed to be the best situated of all the peaks, yet the possibility that a complete astronomical establishment might be one day planted on its summit seemed more like a fairy tale than like a sober fact. It was at that time a wilderness and not even a trail led over it. The nearest house was 11 miles away. The mountain presented numerous advantages on the score of its nearness to San Francisco, the metropolis of the coast, and especially because it was known that the fogs which cover the valley at night-fall, and which last till the sun is quite high the next day, did not, at least usually, extend to the peak. On these grounds chiefly Mr. Fraser recommended and Mr. Lick practically accepted Mt. Hamilton as the site for the future observatory. During the summer of 1876 Capt. Floyd was in Europe, where he met Prof. Holden and visited various observatories, the workshops of Messrs. Grubb, Cooke, Chance and Fiel, and consulted many astronomers. In the autumn of 1876 the third (and present) board of trustees was appointed.

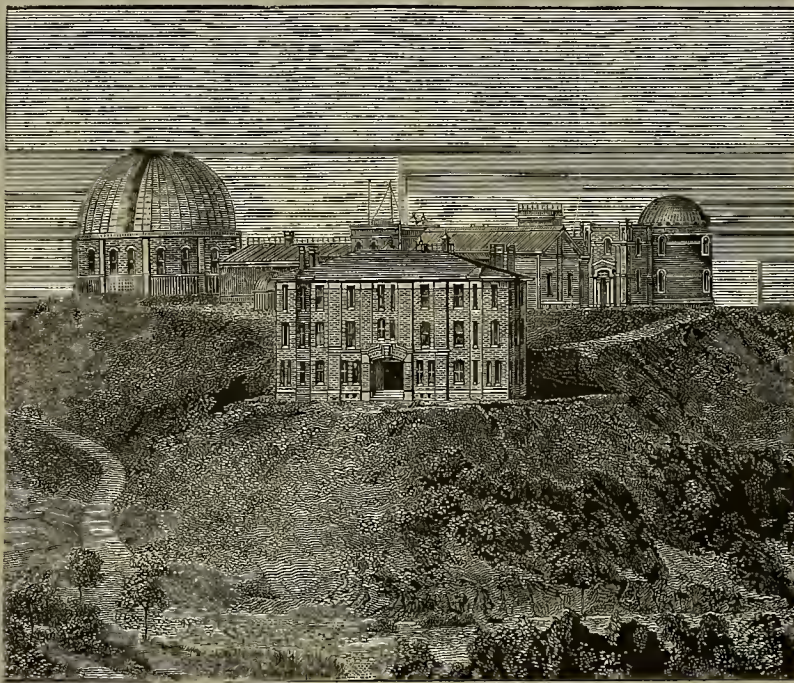
In September, 1875, Mr. Lick had proposed to Santa Clara county to definitely place his observatory on Mt. Hamilton if the county would construct a road to the summit. The proposition was accepted by the supervisors, and the road was completed in December, 1876. A description of this road is given elsewhere in this number of the PRESS. The land for the site of the observatory was granted by Congress June, 1876, and a purchase of 149 acres was subsequently made by Mr. Lick to control the access to the reservation. In 1886 Mr. R. Morrow, whose immense ranch adjoins the observatory reservation on the east, generously presented a tract of about 40 acres, so as to secure the observatory forever against hindrances in close proximity to it.

Mr. Lick died on October 1, 1876. At his death a number of legal questions arose which required some years to thoroughly settle. The time of the trustees was largely occupied with these, though the interests of the observatory

Mr. Burnham, and the other, a standard mercury barometer by Roach of San Francisco, the property of Capt. Floyd, were used for ascertaining the atmospheric pressure.

In the summer of 1879, Capt. Floyd and Mr. Fraser spent a month or more in Washington in consultation with Professors Newcomb and Holden and with architects and draughtsmen. With a detailed survey of the summit of Mt.

pletely across the building from east to west, and is the center or main hall. These rooms all open toward the east into a continuous long hall 12 feet wide and 191 feet long. This hall opens directly into the large dome at the south end, and thus a straight line 270 feet long can be drawn inside the main building, all under cover. This space may be of use in optical experiments. Underneath the whole of the main



THE LICK OBSERVATORY ON MOUNT HAMILTON.

Hamilton as a starting point, a plan for the main building was drawn and adopted by the trustees.

#### Description of the Buildings.

The material for the main building is red brick, made on the observatory reservation at a

building is a shallow space or cellar, which is used for ventilation, for running water pipes, electric wires, etc.

Above the first and principal floor is a continuous attic, directly under the sloping roof. This attic is substantially finished in wood and serves as store-room, etc. At the north end the building is carried up to two complete

prism of hard rock, one foot on the base and from 10 to 32 feet high, it was important to utilize to the utmost the mere standing room.

We may now enumerate the separate rooms, and we will describe those on the lower floor. The ceilings are 16 feet above the floor. Beginning at the north end of the building, the northwest room is circular, 24 feet in diameter. It is the circular room below the small dome. The center is occupied by the brick pier of the 12-inch equatorial. The interior of this pier is hollow, provided with iron doors and serves as a fire-proof safe for instruments. The walls of this room are shelved for storing tools, etc. Next east of the circular room is the north hall, 13 feet 6 inches x 12 feet 6 inches. In this hall are the iron stairs leading to the second floor and the small dome (the north stairs) and also a stairway leading to the cellar below the circular room, which is used as a hattery-room. The northeast corner of the building is a vestibule 13x13 feet. A door in its east side gives access to the transit house. At the north end of the long hall is a window through which the face of the mean-time clock and of two side-reel clocks can be seen from the hall.

Opposite this window is a circular window in the outer wall, through which an observer in the transit house, or in the meridian circle house, can see the clock faces. The first room of the main building is the clock room, 13x20 feet. It contains a pier for the mean-time clock, two piers for sidereal clocks and a brick and cement clock-closet nearly air-tight, with another pier for a clock. The chronometers are kept in this room on wooden shelves suspended from the walls. A chronograph can be placed here and used to compare the various clocks.

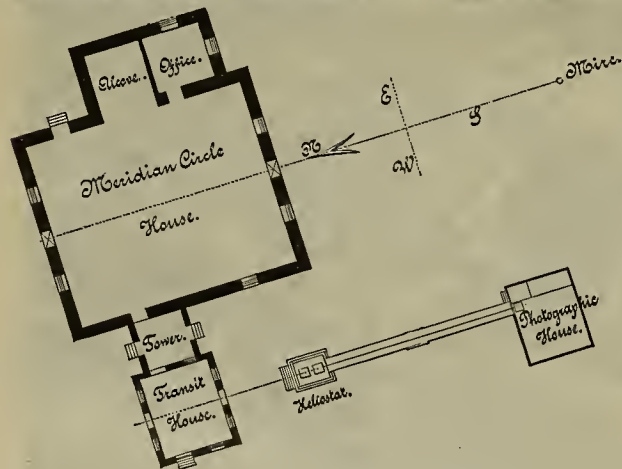
The next room toward the south is 15x20 feet, and contains the measuring engine and smaller instruments. It is called the instrument-room.

South of this again is the assembly-room, 30x20 feet. This opens at its southeast corner into a water-closet and lavatory 8x10 feet.

The visitor's room is 12x18 feet, and is entered from the center hall. It communicates with a ladies' toilet room, 8x8 feet. It contains a beautiful pastel drawing of Saturn by M. Tronvelot, presented by Prof. Holden.

The center hall is composed of three parts. The west entrance or vestibule, the center hall proper 20x20 feet, the east vestibule 20x18 feet. The east door is a principal entrance also. The walls and ceiling of this center hall are all composed of cement, brick and iron, and are fire-proof.

South of the center hall and entered from it



Ground Plan  
of the  
Lick Observatory.  
Scale.



were steadily attended to. During the summer of 1879 Mr. Burnham was invited by the Lick trustees to test the site already chosen, for astronomical purposes, by actually making a series of astronomical observations from the summit. Mr. Burnham's report was distributed in 1880. It was the first astronomical contribution of the new observatory. Its conclusions have been amply verified by subsequent experience.

Mr. Burnham used a six inch refractor (made by Alvan Clark & Sons). A set of meteorological instruments for temperature and humidity were furnished from the San Francisco office of the U. S. Signal Service by direction of the Secretary of War. Two barometers, one a large aneroid by Negretti and Zumbra, graduated to hundredths of inches, belonging to

cost of about \$13 50 per M. The cost of hauling brick from San Jose would have been \$22 50 per M., and its cost at San Jose \$9 per M. As about 2 600 000 bricks have been employed in the whole construction, over \$46 000 have been saved in this way alone.

The outside of the building is painted to preserve it from the weather. This building is intended for offices, workshops, etc., and has the small dome (24 feet inside diameter) at its northwest angle, and the large dome (70 feet 6 inches inside diameter) at its south end. The axis of the building lies in the direction N. N. E. and S. S. W.

The general idea of the building is to provide a series of rooms each 20 feet deep, which lie along the west side of the building (facing San Jose). One of these rooms extends com-

stories. The center tower is also two stories high. The tops of the north tower and of the central tower are flat and surrounded by low brick walls. These spaces will serve for placing small instruments. Just north of the large dome the building is also two stories in height.

The ridge of the slate roof is made flat in a roadway some 18 inches wide. On each side of this roadway is an iron hand-rail, so that a continuous walk is provided from the small dome to the large dome. Around each dome there will be a similar walk, similarly protected by a hand-rail. There are thus three independent ways of passing from the small to the large dome: 1st, along the roof; 2d, along the attic; 3d, along the long hall.

In a situation where every square foot of available surface involved the removal of a

is the secretary's office, 13x20 feet. The walls of this are shelved to the ceiling. A fire-proof safe is provided on its east side. Stairs from this room lead to the second story of the center tower.

South of this room, again, is the library, a very handsome room, 43x20 feet, finished with white polished ash cases and tables, and with fire-places for ventilation. It contains shelf-room from 5000 to 6000 octavo volumes, and draws which will hold about 10,000 pamphlets. The secretary's room opens into the library as well as into the long hall.

#### The Library

Also opens with double doors into the long hall. South of the library and opening into it (as well as into the long hall) is the director's office.



This room is 13x20 feet. Toward the south it opens (through double iron fire-proof doors) into the closet for the large objective. The other (south) pair of iron doors of this closet open into the large dome. This closet is intended to hold a carriage, which, in case of fire is to be placed underneath the large equatorial (pointed to the nadir), and to receive the large objective on a soft mattress or cushion. The carriage can then be pushed rapidly inside the closet and the doors closed. Means will be provided for holding the large telescope vertical during this process. The large dome needs no special description here. It is to be 76 feet in exterior diameter and opens into the long hall (through iron doors) at its northeast side. It opens into the closet for the objective described, and into another fire-proof closet just east of that last named. This will contain a sidereal clock and chronograph, and also the machinery for rotating the dome. A reference to the accompanying plan will make the above description clearer.

The cellar of the circular room is fitted as a battery-room. A cellar is also provided under the large dome, seven feet high, which will be fitted with shelving to receive photographic negatives. The rest of the building has only a shallow space four feet or so in height, for purpose of ventilation, etc.

The second or attic floor can be reached by three stairways. The north stairway, which is of iron, leads from the north hall, near the small dome. The center stairway leads from the secretary's room. The south stairway leads from the south end of the long hall to a large room over the fire-proof closet.

On the second floor we have the small dome, 24 feet in diameter. Also a hall entering it which is 14x13 feet, and just above the north hall. The north stairs end here, and double iron doors close the entrance to the attic. Above the north vestibule is the office for the 12 inch equatorial, about 13x13 feet. This room is completely fitted for the comfort of the observer with desks and bookcases. The north attic extends from the north to the center hall. Here it is broken, and to pass to the south attic it is necessary to turn to the east in a small hall which leads to an office-room just over the east vestibule. This room is also fitted as a computing-room. The south attic extends to the north wall of the large dome. Iron doors are provided at all necessary places. The disposition of the roof has been previously described. The roof is accessible by three stairways; in the north end of the building, at the center and just north of the large dome. An observer can also step out of the slit of the large dome on to the gallery round it and on to the roof of the main building.

#### The Dome for the 12-Inch Equatorial.

The objective and tube of the Clark 12-inch refractor was originally made by Alvan Clark & Sons for Dr. Henry Draper, and were mounted in his private observatory at Hastings-on-the-Hudson. The objective is of the very finest quality. It was mounted at the Lick Observatory in October, 1881.

The dome is a hemisphere 25 feet 6 inches in diameter, made of thin plates of nickel-plated



THE DOME FOR THE 12-INCH TELESCOPE.

copper secured to a light framework of wood. It springs from a circular ring of cast iron of the same diameter outside, which has on its lower surface a track three inches wide. A circular bed-plate with a double turned track rests upon the cylindrical wall of the tower, and supports a "live ring" containing 14 wheels, each

consisting of three separate wheels, forming conical fuses about 10 inches in diameter, turning on the same axis. The dome is supported by this live ring, the exterior wheels traveling upon the double track of the bed-plate, and the interior wheels upon the broad single track on the bottom of the ring which forms the base-

plate of the dome. The slit for observation is three feet wide and extends beyond the zenith. The shutter is a curtain of thin corrugated steel, which is wound upon a drum at the upper end of the slit by ropes which can be reached from the floor. This arrangement has, however, been found unsatisfactory, and will be replaced by rolling shutters to be furnished by Warner & Swasey. The mechanism for revolving the dome is novel, simple and efficient, and is the invention of Captain Floyd and Mr. Fraser. An endless wire rope passes around the outside of the dome just above the base-plate, over guiding pulleys and down around a groove in a two foot wheel placed in a recess in the wall of the room below. This wheel is rotated by a crank geared in the proportion of 3.1, and the friction of the rope on the outside is sufficient to turn the dome. To give the dome a complete revolution requires 41 turns of the crank, and it can easily be effected in less than two minutes. The approximate weight of the dome is eight tons.

#### Meridian Circle House.

The meridian circle house, completed in 1884 from the design of Professor Holden, is 43x38 feet, with a wing 27x11 feet on the east. The walls are double throughout. The outer frame carries a Louvre work of galvanized iron, which completely prevents the sun from striking any part of the building proper. The inner walls are of California redwood, which is almost incombustible, and between these and the outer walls is an air space 24 inches wide, which extends completely around the building. The ceiling is also of redwood. It is 16 feet above the floor, flat in the center of the room, and arched over to connect with the side walls. A very large air space above the ceiling communicates with the room itself through wire netting which covers the sides of the observing slit, and complete access to any part of the air spaces, both of the walls and of the roof, is provided by doors opening into the interior room. On the west the room opens into a ventilating tower two stories in height, which also adjoins and is connected with the house for the meridian transit instrument, which lies still further to the west. The design of this construction is to keep the temperature of the two houses and of their air spaces precisely the same as that of the external air, and it is probable that this object has been practically attained. The upper room of the ventilating tower ought to furnish an admirable exposure for meteorological instruments.

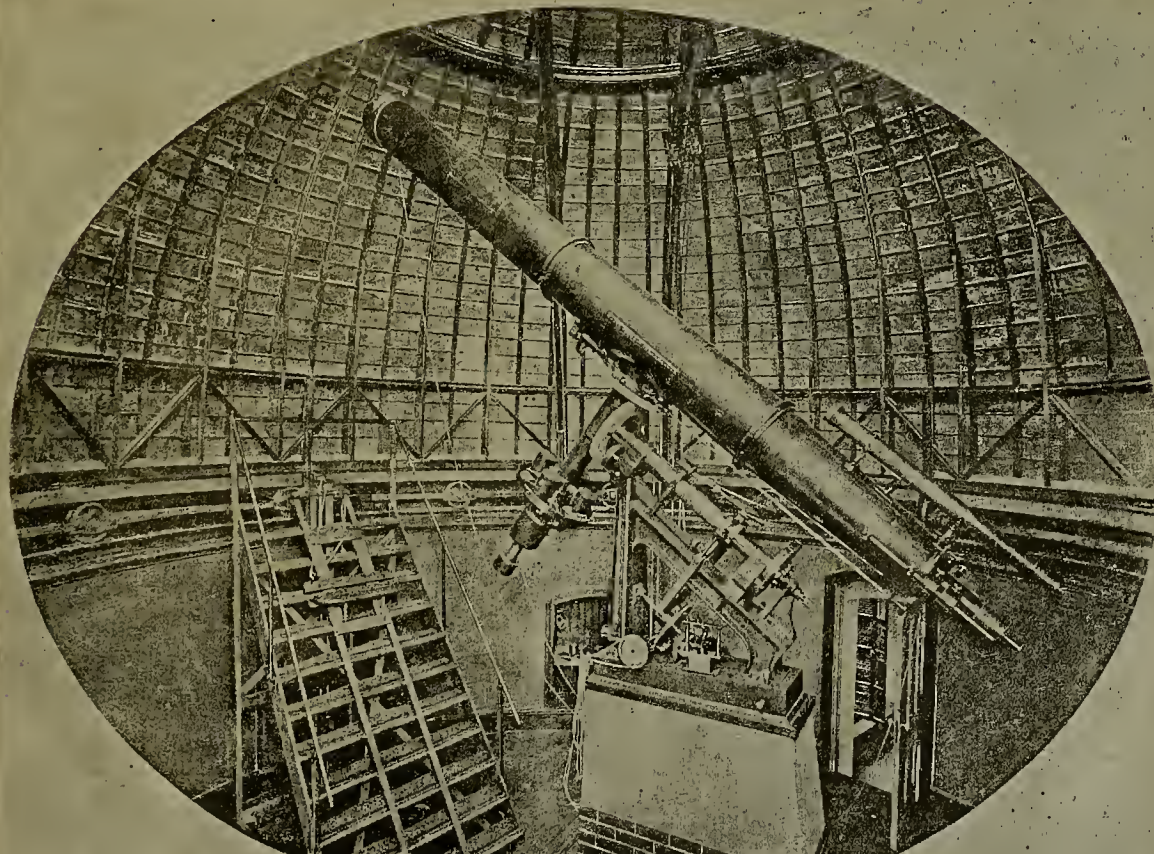
The wing on the east side projects 11 feet from the main building, and contains an office-room for the observer with the meridian circle. This room, which communicates with the meridian circle house by double glass doors, is provided with closets for small instruments, and is comfortably furnished for its purpose. The remaining part of the wing forms a recess which receives the rolling canopy of the meridian circle when the latter instrument is in use. On the west side of the room is a closet with glass doors, which contains the Dent sidereal clock No. 1847.

The piers of the meridian circle are of brick. Each is 33 inches square where it passes through the floor, and tapers to 23 inches at the top, the inside faces being vertical. The height of the piers above the floor is 4 feet 10 inches. Platforms surrounded by hand-rails, and provided with seats are arranged for the convenience of the observer at the microscopes.

The piers for holding the north and south collimators are 6 feet x 7 inches x 2 feet 10 inches at the floor level, tapering slightly toward the top, and 5 feet high. The ends facing the meridian circle are 22½ feet apart. These piers, as well as those of the central instrument, are cased in polished Spanish cedar. A narrow platform, 25 inches above the floor, is supported by brackets on the east and west sides of the casing of each pier, and is extended on the north (or south) to the inner walls of the building, giving easy access to the eyepiece of the collimator. Steps lead up to these platforms on both sides.

The east and west collimators are mounted on piers 3 feet 10 inches x 2 feet 9 inches at the floor and 6 feet high. The ends facing inward are 24 feet apart. The arrangement of casings and platforms is much the same as that for the piers just described. A double steel track extending between the north and south collimator piers receives the wheels of the observing couch, the reversing carriage and the mercury artificial horizon, and a single track extending eastward from the west pier of the meridian circle supports the canopy which protects the instrument from dust when it is not in use. This canopy is 10 feet 6 inches and 11 feet high. It is built of white ash and cedar, and each side is formed of four large plates of glass. The ends are closed by heavy curtains. The slit for observation is 3 feet 4 inches wide. At the north and south it is closed by double shutters 20 feet high, and overhead by four shutters each 25 feet long and 2 feet wide, hinged at the sides of the slit and opening outward. Four ropes pass-

(Continued on page 401.)



2421 Lick Observatory, Mount Hamilton, near San Jose. Interior—the 12 inch telescope in North Dome.

Photo. by H. E. Matthews. Published by T. L. S. P.

THE 12-INCH TELESCOPE IN THE NORTH DOME.



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**FREE GOLD.**—Amador Dispatch, June 16: We have been handed some specimens of rock taken from the Live Oak mine, about two miles westerly from town, owned by Messrs. Parker, J. K. Thomas, F. Walker and Harry Seymour. The specimens handed us are well sprinkled with glittering specks of free gold, and show the mine to be one of value. The owners of this mine are local residents and have done their own work on the mine.

**KENNEDY.**—Amador Ledger, June 16: The sinking of the main shaft is making satisfactory headway; the total depth is now about 1100. It is not yet fully decided whether the sinking shall be prosecuted 100 or 200 feet deeper. A station for a new level will be cut at the 1052 level. The mill is kept running steadily, to as much of its capacity as the sinking operations will admit. Last month 2160 tons were crushed, the ore mainly coming from the 750-foot level. The cleanup amounted to \$2000 in free gold, and the sulphuric acid will give about \$2300 more; making a total of \$11,500; or an average of \$5.20 per ton. This is considered a very satisfactory result. The mine is unquestionably on a solid basis for permanent working. The ore chimney is over 400 feet long, and the best ore obtained from the deepest levels, leading to the conclusion that even better results than any heretofore obtained may be looked for when new levels are opened in the sinking now in progress.

**AMADOR GOLD MINE.**—Ginocchio Bros. have received orders from the Amador gold mine for 40,000 feet of lumber, for the construction of the mill to be erected on that mine. We are informed by Mr. Minear that the mill will be built under two or three separate contracts. One contract covers the iron work and machinery; another calls for a supply of lumber, and a third will be let for the erection on the ground. A thoroughly experienced millwright has been consulted, and will no doubt be employed to look after the latter work. The stamps are to be 850 pounds each, and are estimated to crush from 2½ to 3 tons each every 24 hours. To accomplish this result, it is intended to put in a rock-breaker of a new and improved pattern, that will crush the ore considerably finer than the ordinary breakers.

**SUTTER CREEK MINE.**—For the week the superintendent reports this mine has extracted 75 tons of ore and milled the same from crosscut No. 7. Ore on track floor harder and higher grade. Assays ranging from \$3.50 to \$5.50 per ton. Cutting out a station for crosscut No. 2, 100 feet further north on ledge.

**MISCELLANEOUS.**—S. S. Granger, in prospecting in the neighborhood of Pine Grove, struck a rich pocket-ledge on the ranch of W. K. Harding; some of the ore is estimated to be worth \$500 per ton. A. P. Minear, when in San Francisco lately, ordered an air compressor for the Amador gold mine. The machinery is now in process of construction. It is intended to run three drills. It is reported that sinking operations will be commenced at the Zeile next month. If correct, it will necessitate the laying off of a number of hands, as only a portion of the mill can be kept running while sinking is in progress.

## Calaveras.

**CALIFORNIA MINE.**—Calaveras Chronicle, June 16: We were shown some very rich rock which was recently struck in the California mine, located about three miles from Railroad Flat on the South Fork of the Mokelumne river. The tunnel in which the ore was struck is in about 100 feet. Another tunnel above had been run some 70 feet, and an "upraise" is being made from the one to the other. The ledge is 14 inches wide and very rich in free gold.

**WASHING TAILINGS.**—Sam Pearsall and Joe Leboy, Jr., have sluices set and commenced washing the tailings of the Corral Flat mine.

**GOOD ROCK.**—Calaveras Prospect, June 15: The success which sometimes comes to reward the patient industry of those who spend years of toil in mining, has never been more well deserved than the good luck which is now an assured fact to the owners of the McCreight & Hardy mine, at Albany Flat near Angels. Yesterday we had the privilege of inspecting some specimens of gold mixed with quartz, taken from this mine, that seemed to excel in richness anything in this line ever taken from the treasure vaults of old Calaveras. But we do not make our report on specimens alone. The mill is now running on rock which for the past ten days is yielding bullion at the rate of \$1500 per day, running time.

## Contra Costa.

**THE COAL MINES.**—Contra Costa Gazette, June 13: Work is being pushed ahead at the coal mines and everything looks favorable for a lively summer. The West Hartley near Jucosville has been sinking a slope of about 400 feet, and a new railroad has just been completed from Empire to this mine. The slope has been driven down between the two veins of coal, and after sinking a hundred feet further, tunnels will be driven back to the veins. The coal from this mine is of a good quality and is transported by rail to Antioch. At Central new machinery has been put up and the company are sinking deeper on the lifts. Steam was gotten up for the first time yesterday and the new machinery will hoist coal immediately. The smoke stacks are on the ground at the old Independence shaft at Somersville, and the boilers are daily expected to arrive. Work will be pushed ahead at this mine and when some hundred feet of water is pumped out of the old shaft the old Clark vein can easily be reached and worked. This vein is said to contain the finest coal in the district, and is known to be very large and easy to work. When once under way this enterprise will live up to Somersville and employ many men. Mr. Jas. Dickinson has taken a contract to sink another lift in the Stewartville mine, and will place the coal in the bunkers at a stated price for Belshaw & Co.

## Montsrey.

**SLACK'S CANYON COAL MINE.**—San Miguel Messenger, June 15: Your correspondent visited the Slack's Canyon coal mines recently. Work was be-

ing pushed on in a brisk manner, and everything evidenced the ability of the superintendent in the working of these valuable mines. Long before arriving on the grounds the visitor sees the huge clouds of smoke looming up, making the place easily identified at a great distance. One tunnel is now in 1200 feet, all of which, except 150 feet at the entrance passes through a solid mass of coal. Three other tunnels are in from 200 to 300 feet and the coal becomes of better quality the farther they penetrate. These mines are in Monterey county, near the headwaters of the creek that flows down Indian valley, which we believe will be the most practicable route for a railroad connecting the mines with San Miguel.

## El Dorado.

**MILL.**—Georgetown Gazette, June 14: We understand that a three-stamp mill is being put up on the old McKusick mine near Volcanoville.

**JOSEPHINE.**—The new concentrators for the Josephine mine are at Auburn station, and will be brought up in a few days. J. M. Nobgues is building a sawmill at Mt. Gregory. It is said that the mill is for his own convenience as he is using a large amount of lumber at the Josephine and other mines which he is operating in that section.

## Nevada.

**THE SPANISH MINE.**—Herald, June 13: The Spanish mine, near this city, is on the Providence and Merrifield lode, on the north extension of the North Merrifield. It has been partially worked in the way of development, for nearly 15 years. Just enough has been done to prove that it is a valuable claim, and no more. There is a tunnel now being run which is showing a body of ore about four feet in width, and which looks well. The workmen have out about 64 tons of ore, which experts say will pay. The owners of the Spanish have been discussing the property of erecting a mill this season.

**THE MULLER AND WALLING MINE.**—Herald, June 13: The lessees of the Muller and Walling mine have their hoisting and pumping apparatus up and in working order. They have the shaft, which is down 40 feet, all cleaned out and repaired and are now ready for sinking. They use an overshot water-wheel. The machinery they think is capable of sinking and pumping to a depth of at least 250 feet. The ledge in the bottom is about 14 inches in width and rapidly widening out. It will be remembered that this claim is the northern extension of the Nevada City mine.

**MINING AT MOORE'S FLAT.**—Grass Valley Union, June 16: S. L. Blackwell, who was in town yesterday, said that the mining prospects at Moore's Flat were improving, as several of the old mining claims are being opened up as drifting claims, by the driving of tunnels, and if it is found that the ground is sufficiently rich to work by that process, quite a large force of men will be employed within the next year. There are more men engaged in mining now in that vicinity than there were last season. At Graniteville there has been a considerable increase of population through the quartz operations, and times will be lively through the coming season. Moore's Flat is also to receive benefit from quartz operations as there are plenty of veins in that vicinity from which good prospects in gold can be obtained.

**PLANET.**—Grass Valley Union, June 17: The Planet mine is situated in the Lowell Hill mining district, in this county, and has been worked as a drift gravel mine for the past 15 years. A tunnel 2800 feet long has been driven toward the channel, and the company are now confident that it has been reached.

**THE ORIENT MINE.**—North San Juan Times, June 15: In the vicinity of and about a mile from Nigger Tent is a gravel claim called the Orient. Its owners have formed themselves into a company, have levied an assessment and proceeded to satisfy their suspicions as to the existence of pay dirt in their mining property. Among others, John German and H. H. Buhning of this town are interested in the scheme and have at present four men at work in its development. The gravel channel is being looked for by means of a tunnel run into a hill on the claim, and at present writing, progress of 90 feet has been made, but it is expected that at least 700 feet more will have to be added to this before gravel is struck in paying quantities. The tunnel is in good picking ground and the Orient Co. are satisfied with the headway being made. Such action on the part of men who, in a business way, have been injured by the suppression of our neighboring hydraulic mines, shows that they will not "down at Caesar's bidding," but are going to see if it is possible for them to live things up a little by opening a mine that will be a source of revenue to its projectors and also afford occupation for some of the many idle miners in this section.

**A RICH GOLD FIELD.**—Nevada City Herald, June 13: There is a gravel channel back of this city which has produced about \$3,000,000, and about all the ground worked to secure that much bullion was comprised in a patch of ground less than 3000 feet in length. The same channel extends up the ridge and there is little doubt of it not being as rich most of its length as it was where this money was taken out. Remember that the amount mentioned was extracted by drift process over 28 years ago. The channel has lain idle, practically speaking, ever since that time. There are millions of dollars sleeping up there to-day, and only waiting to be mined to distribute themselves into the channels of trade. There is ground there that can give profitable employment to hundreds of laboring men at the best rates of wages. The Manzanita mine owners started in last season to develop parts of their ground. They have worked quietly and have all this time been doing dead work necessary to the putting on a force of men. We understand from the best authority that they have ground now opened that will yield \$100,000 to the owners, when washed. There are other claims as good, or better. That old channel will yet make this place very lively and prosperous.

**WASHINGTON.**—The prosperity of this section depends wholly upon mining. Capital invested in mines here in the past has hardly ever failed to bring in good returns. The Yuba and Eagle Bird have long been paying mines and have grown better as the depth has increased, while the Blue Bell and Washington mines, both of which were started last year and are paying well, prove that good ore is not confined to one or two ledges. It is claimed that the rock at the Erie yields \$12 per ton, and it is easily worked. So with a reasonably good prospect

capitalists need not fear to invest their money in Washington district. Those who wish to invest in mining cannot do better than to visit this district and see for themselves what is being done and can be done.

## Placer.

**SUNNY SOUTH.**—Cor. Placer Herald, June 16: The famous Hidden Treasure mine continues to declare its regular monthly dividend, and never looked better. They are running on an average 375 carloads per day, and are working quite a force of men.

## San Diego.

**BANNER.**—Julian Sentinel, June 16: The ball is rolling for a big mining boom in Banner, at last everything points that way; new mines are being discovered and old ones opened up. The Ready Relief mill is now running over 100 tons of ore from the mine. Coffman & Redman have 15 tons on the dump ready to crush. The Cincinnati has 10 tons on the dump—very rich ore. The Hidden Treasure is booming up, being worked by some Colorado men. Will Meiner is opening up his mine, the extension of the Cincinnati. Davis & Walker have their tunnel on the Worlock in about to the ledge, and will soon be taking out ore.

## Shasta.

**FROM IGO.**—Cor. Shasta Courier, June 16: It is reported that Senator Forster has sold his Bullychoop mine to an English company for \$600,000, which may make quite a stir in mining circles this season. The Astras on South Fork are all running on average rock. Bennett & Shaw have bonded the Woodfill mine on Andrews creek, and are prospecting the same. The Hardscrabble mine has made its final cleanup for the season, which was very satisfactory.

**FROM LOWER SPRINGS.**—Conant & Co. have made several runs upon ore from different ledges here. The quality as well as the quantity is satisfactory to all concerned, and many batches from other mines are waiting their turns. Conant & Co. are now prepared to work ores by a dry crusher. They will then roast and work through pans. Their process includes only rebellious ores. They also have a wet crusher. The particles pass over copper plates and over Dodge concentrators. But what we miners are praying for is a first-class pan or pulpmill in our midst. The reduction works at Redding are six or seven miles from our most valuable ledges. We have a large quantity of low-grade ore in and about our camp, and the gold being very fine will require a pan and settler process in order to work the ore up to a high percentage. This latter process is required at least on ores from the croppings. When we reach the water level the ore will carry a much higher percentage of sulphurets and will require concentrators. The gold ore upon our croppings is very fine and is of a rather free-milling proposition. This pan process works well on all croppings of ore. It matters not if the ore is a little rebellious. We are waiting patiently for some moneyed party to erect a first-class mill that will save our gold up to the proper per cent; then our miners, with renewed vigor, will pitch in and demonstrate to the public that we have mines here in this partly forgotten camp.

## Sierra.

**RICH ROCK.**—Mt. Messenger, June 16: We learn that very rich quartz has been found in the Alaska mine, richer if possible, than any hitherto found. We learn that some very good rock has been found in both upper and lower tunnel at the Forest Queen Quartz Mine. Dr. Biber has charge of this mine, Geo. Fries being foreman. Prospectors and capitalists are rather numerous this spring in Sierra county.

## Trinity.

**EAST FORK ITEMS.**—Trinity Journal, June 16: Capt. Trueworthy returned from East Fork and gave us the following items: Work is being done on the Belle mine in the way of running tunnels and development; the ledge is six feet wide and carries free gold and sulphurets. The prospect of the mine is favorable. Development work is also being done on the Grizzly. About 50 tons of ore on the dump at the Star mine; these three mines are near Barney gulch. Day & Moor are crushing ore from the Ozark. The Enterprise owners are also crushing ore from their mine. There is considerable ore on the dump of the Thanksgiving. Frank Moor has taken out about 25 tons of ore from his ledge. Work is progressing on the Orland. The owners of the Webfoot have run in two tunnels on their mine and have the ledge in each; they have a good property. The North Star, on which work has been suspended for some time, has been cleaned out and work will soon begin upon it. The need of the district is a wagon road and measures are now being taken to complete the road already begun.

**KNOW-NOTHING CREEK MINES.**—Journal, June 16: Mr. D. Hansen reports favorably on the outlook for this camp and is well pleased with his investments there. The Hansen mine is looking well and the company is doing a great amount of work on it. They are now principally occupied in running a 300-foot tunnel to tap the ledge at the depth of about 200 feet; 282 feet of the tunnel was completed when Mr. Hansen left and they expect any day to reach the ledge. They have purchased an arastra to be used exclusively for crushing ore from that mine and enough will be taken out to keep the arastra running constantly during the entire summer. Crushing will be commenced next week. The ledge in the Know-Nothing mine averages about 18 inches and is showing satisfactorily to the owners, under the superintendency of Mr. P. P. Black, an experienced miner. Arrangements have been made to put up a 4-stamp mill which will be kept running on the large quantity of ore now on the dump and in sight. Two shifts will be worked from this time so that hundreds of tons of ore will be deposited on the dump by the time the mill is completed. They now have a tunnel in about 100 feet and it will be run still farther in order to give them plenty of stopping ground so that no difficulty will be experienced in keeping the mill running. A ditch will be dug to take the water from the creek to the mill which will enable them to run during the entire year. Radefinger, Hansen & Co. have several good locations in the district. The Gold Run is receiving their attention particularly at present, and the ore which they are crushing in their 4-stamp mill is giving satisfactory results. They have the mine in good working condition and the ledge is looking well. Several discoveries have been made recently which promise well and it is expected that many miners and prospectors will find their way into the camp during the summer

months. There are now 35 men in the camp and as soon as the new mill is set in motion it is likely that a few more experienced miners will be given employment.

## Tuolumne.

**BEGINNING WORK.**—Sonora Democrat, June 16: Messrs. Chas. Smith and Henry Wilson will in about a week be ready to begin operations on their Brown's Flat claim. Mr. Geo. Meade the millwright, is putting in a fine little hoisting plant. It is estimated there is over a hundred feet of vertical fall, and that seven inches of water will run the wheel which is designed somewhat after the manner of the Knight wheel. From Mr. J. Hagan, Supt. of the Buchanan mine, we learn that everything is going ahead with vigor and energy. The shaft is now down to a depth of 700 feet and drifting is going on both east and west. The body of ore is very large and highly sulphureted. It all averages well in free gold. The chlorination works are getting well under way and the brick kiln which will do about the 4th of July, will furnish it is estimated about 60,000 brick. The works will be completed by the 1st of August. The concentrations now amount to 350 tons, and the assays denote that they will pay \$150 per ton of 2000 lbs.

## Ventura.

**AS GOOD AS COAL.**—Ventura Free Press, June 16: Owing to the amount of water encountered in sinking the shaft at the coal find, work has been temporarily suspended, but the owners thereof have not been idle. They have been developing a strata of bituminous rock which is likely to prove of almost if not quite as much value to the owners as a coal mine. Specimens of the bitumen have been submitted to test and found to be superior to any other now in use on this coast. Mr. Perine, who has the contract for paving State street in Santa Barbara, and who has used all the varieties and qualities of bitumen now used in this State, has examined specimens of this Ventura product, and pronounces it of superior quality. He offers \$11 per ton for it at a venture. Others who profess to be judges of the article say it is worth \$18 per ton. The indications now are that there is an abundance of it. Mr. Perine, the Free Press is informed, will visit Ventura in a day or two with a view of organizing a company to work the quarry and to develop it.

## Yuba.

**RICH GRAVEL.**—The Marysville Appeal, June 15: "S. O. Gunning has returned from a trip to Smartsville and vicinity. While there he visited the Blue Point mine, which is owned by six Marysville gentlemen, and expressed his belief to an Appeal reporter, that they had struck the richest pay gravel that had ever been handled in Smartsville. The reporter then called on J. A. Sneed, who is interested in the mine, and from him obtained a brief statement: 'We have gravel enough ahead,' said he, 'to do three years' good work, but we want to get more than that, and want to prosecute until we have found which lead will pay best. John Dunne is up there now with about ten men. In the last eight days he has taken out over \$500 by the arastra process, which is talking pretty lively.'

## NEVADA.

## Washoe District.

**SIERRA NEVADA.**—Virginia Enterprise, June 16: Repairs to the south drift on the 520 level still continue. The timbers were a good deal broken and required easing in most places along the drift.

**KEYES.**—Are sinking the main shaft to a greater depth.

**CHALLENGE.**—The raise from the 1100 is in ground of a favorable character.

**SEG. BELCHER.**—The east drift from the 1300 raise is in quartz giving fair assays.

**UNION CON.**—No. 1 east crosscut on the 1300 level still continues in vein porphyry.

**MEXICAN.**—East crosscut No. 1 on the 1300 level is in a mixture of porphyry and clay.

**BULLION.**—Good headway is making in the drift started south from the 640 level winze.

**OEST.**—The ore breasts are looking and yielding well. The ore is being worked at the Briggs mill.

**MONTE CRISTO.**—Good headway is making in the drift extended to connect the new and the old shafts.

**BALTIMORE.**—The drifts on the 380 level are being cleaned out preparatory to the resumption of work.

**POTOSI.**—On the 500 level the north drift is out 579 feet. The face still shows quartz of a promising character.

**SCORPION.**—The south drift on the 300 level is out a distance of 327 feet. The face is in hard vein porphyry.

**CROWN POINT.**—A southeast drift has been started from the 700 station to connect with work down from the 600.

**CONFIDENCE.**—Are shipping daily to the Brunswick mill 186 tons of ore, the battery assays of which average \$27.05 per ton.

**HAYWOOD.**—Good ore is being found below the 300 level in the deepest workings. The Thompson mill, Lower Gold Hill, is being run on ore from the mine.

**IOWA.**—The south drift from the east drift has been advanced 35 feet; total length, 60 feet. The face is still in vein matter of a promising appearance.

**ANDES.**—Are running south from the east crosscut on the 350 level in a very good looking quartz. Are sinking a winze on the 240 level 700 feet north of the main shaft.

**WEST YELLOW JACKET.**—The car track in the northwest drift is completed. The drift is now in a distance of 64 feet. Good ore is coming in at the bottom of the drift.

**UTAH.**—On the 372 level, opposite the south drift, a north drift has been advanced 38 feet. Formation quartz giving low assays. The face of the drift is showing some value by assay.

**BEST AND BELCHER.**—The northwest drift started from the main west drift has been extended 45 feet; total length, 250 feet. The formation is quartz, showing some value by assay.

**ALPHA.**—The north lateral on the 382 level is out 287 feet. The face is in clay and quartz. The east crosscut in the north lateral drift is out 47 feet. The



face is in clay. The west crosscut in the north lateral drift is out 41 feet. The face is in quartz. Have commenced to sink to the 500 level. The formation has a favorable appearance.

**ALTA.**—The ore reserves on the 825 and 1150 levels are yielding their usual quota of ore, which is being reduced at the mill. All the machinery is running smoothly, and the mine is looking well.

**OPHIR.**—On the 1465 level are still retimbering the south winze down from the 1300 level to the point of its connection with the east crosscut run from the end of the southwest drift from upraise No. 2.

**LADY WASHINGTON.**—Are raising from the 725 level, and are now up a distance of 342 feet in clay adjoining the veins. Are crosscutting from the raise at a height of 110 and 210 feet above the 725 level.

**BELCHER.**—The 500 west crosscut advanced 25 feet during the week, making the total length 77 feet. The face is in soft porphyry. The 1300 raise advanced 15 feet in quartz assaying from \$10 to \$12 per ton.

**CHOLLAR.**—The north drift on the 550 level is in 386 feet. The face is in low-grade quartz. The north drift on the 450 level is in 538 feet. The face is in quartz averaging \$20 per ton, which is being worked at the Nevada mill.

**YELLOW JACKET.**—About 90 tons a day of gold quartz is being shipped to the Santiago mill. Good headway is making in the work of opening out the 800 and 900 levels, from which the country between the Jacket and Imperial shafts will be prospected.

**GOULD AND CURRY.**—The southeast drift started from the top of the upraise from the drain tunnel has been extended 43 feet; total length, 85 feet. The formation is porphyry and quartz. During the week there have been extracted from the 250 and 300 levels and shipped to the Douglass mill 222 tons and 1500 pounds of ore, the battery assay of which averaged \$21.52.

**CON., CAL. & VIRGINIA.**—The stopes in the vicinity of the winze sunk below the 1425 level are yielding a large amount of good ore. The 1500 level upraise from the end of east crosscut No. 1 is still yielding well, and all the stopes of this level continue to show good ore. Upraises Nos. 1 and 3 from the 1600 level continue to yield well. On the 1550 and 1650 good prospects are being obtained. The usual amounts of ore are being shipped to the Eureka and Morgan mills and the average assays will be about as usual.

**SAVAGE.**—On the 400 level are stoping ore from the north and south drifts. The south drift was connected with the north drift from the Hale and Norcross on the 11th instant. On the 500 level the main west drift from the shaft has been advanced 32 feet in a fine body of quartz that gives some good assays. Have started a drift south on this quartz body, which is now advanced 12 feet in ore that averages by assay \$35 a ton. From between the 400 and 900 levels are extracting 80 tons of ore a day. Have shipped to the Rock Point mill 541 tons, the average assays of which is \$22 a ton.

**HALE & NORCROSS.**—During the week have hoisted 1650 tons of ore from the 600 and 900 levels, and have shipped to the Mexican mill 900 tons and to the Nevada mill 535 tons of ore, the assays of which average \$34 per ton. All the stopes throughout the mine are looking well. Have commenced to extract ore from the new upraise from the end of the main drift west on the 700 level. The upraise is now up over three sets in fine ore. The north drift on the 400 level has connected with the south drift from the Savage. The drift shows ore of a fair grade. The total number of tons of ore worked last month was 5925, which yielded \$169,685.98. Bullion on hand and previously shipped this month, \$32,000.

#### Tuscarora District.

**NAVAJO QUEEN.**—*Times-Review*, June 16: South-west drift from crosscut 200-foot level advanced 15 feet during the week. No material change to note.

**NORTH COMMONWEALTH.**—The shaft has been sunk and timbered to the depth of 76 feet. A crosscut started and extended 20 feet. Indications are favorable.

**DEL MONTE.**—The tunnel has been extended a total distance of 176 feet. Work has been discontinued in the face for the present and a crosscut started 76 feet from the face.

**BELLE ISLE.**—The old stopes continue to yield some medium-grade ore.

**NAVAJO.**—South drift from No. 4 crosscut advanced 6 feet; and crosscut west 9 feet, south drift on winze on east vein 250-foot level has been advanced 11 feet.

#### Eureka District.

**ORE SHIPMENTS.**—Eureka *Sentinel*, June 16: The following number of tons of ore were shipped from the mines of the district to the furnaces during the week: Dunderberg mine, 68 tons; Ferrell, 63½ tons; Allen, 3 tons; White Pine, 6½ tons; Dimmick, 20½ tons; El Dorado, 5 tons; Woodchopper, 20½ tons; and Silver Lick, 20 tons. From the Bowman, 3 tons and Silver Lick 9 tons.

**A FRESH STRIKE.**—Bob Northy, the Greenwood brothers, and others have lately been interested in two tribute pitches in the Silver Lick mine at Adams Hill, one adjoining the other. Several days ago one party struck ore close on the boundary line of the two pitches, and rather than quarrel the parties agreed to all work together under an agreement among themselves. They are down in a deposit of ore about ten feet, and so far it shows up about five feet thick, and they have ore all around them. We learn that they took out five tons in a half shift, and it made only a comparatively small hole in the deposit, the extent of which is not yet known, but it is said to be the best thing uncovered in that locality for some time past.

#### ARIZONA.

**AROUND PRESCOTT.**—*Courier*, June 14: Kerr mill, in Weaver district, is ready to run. Judge John J. Hawkins, resident agent for the Etta M. & M. Co., has a letter from Supt. Johns, telling him that the stamps are pulverizing 20 tons a day. Mine producing gold-bearing rock. Machinery for Copper Basin is arriving by rail. We have samples of the ore that will go 75 per cent copper. If we are not greatly mistaken, the property is a good one and will help make Prescott a large town. The force at the United Verde and Copper Basin mines will be

increased in a short time. A bar of placer gold, worth \$114 was yesterday shown us at the bank of Arizona. It was brought up from Kirkland valley by Win. Rudy. Talk is that Messrs. Brann & Mitchell have sold mines in Turkey creek district to Thos. S. Morgan of New York, for \$25,000. Mr. Tracey, who owns the richest placer mine in the county, was here recently with a few handfulls of nuggets. Wm. Jennings' Onetime mine, Hassayampa district, is five feet wide; has a three-foot pty streak, which yesterday assayed \$59.12 gold, and \$7.76 in silver to the ton. It is opened to a depth of 20 feet. N. C. Shekles made us feel good yesterday, while telling of fine ledges of gold and silver-bearing rock near Bradshaw Basin. Mr. Place is putting on more miners. He will sink a large working shaft at boundary of Crowned King and Moody & Place mines. The Ora Billa Co., in same section, are meeting with good success. Dan O'Boyle has brought in another big bar of gold from the Montgomey mine. Judge Rush and Mr. Ed. W. Wells, who recently returned to Prescott from Eureka district, say that they were more than pleased with Riggs & Lawler's Hillside mine. Never before had seen anything so rich.

**BIG BUG DISTRICT.**—*Prescott Courier*, June 12: Big Bug will soon be a booming camp. The completion of the Van Name quartz mill with the continual improvement of the mines, as development goes on, will surely bring a golden reward to all those that have faithfully kept to work. The mill, with just such old-time, practical men to run it as Mr. Charles Bassett, with the mineral, wood and water in abundance, is just what will make a good camp and put money into circulation.

#### COLORADO.

**GOLDEN SMELTING WORKS.**—*Denver Republican*, June 14: The Golden Smelting Works, probably the oldest smelting plant now in operation in this State, is doing good work, notwithstanding the fact that the smelter is rarely mentioned in the press of the State. The establishment has in use two shaft water-jacket furnaces, two calcining furnaces and three fusing furnaces. The last five furnaces are modifications of the ordinary reverberatory furnaces. The ore supply of the Golden smelter is derived largely from the mines along the Clear creek canyon, above the town of Golden, although some ore is also purchased in the Denver ore market, and occasional large contracts are made with Leadville mines producing sulphides ore. Owing to the general refractory nature of the ore treated at these works, its capacity does not exceed 50 tons a day. The product of the furnaces is usually of very high grade, the last lot of base bullion averaging \$1000 per ton, about one-half of the value consisting of gold. R. Koenig is manager of the affairs of the company and F. W. Clark superintendent.

**COLORADO SMELTERS AND MILLS.**—There are now about 42 water-jacket silver-lead furnaces in blast in this State, reducing on an average about 1650 tons of smelting ore a day. There are also five reverberatory furnaces, running on copper ore, reducing 125 tons daily. In addition to the above there are innumerable reverberatory furnaces, employed in calcining and fusing ore preparatory to smelting. There are also in use in the State about 1000 stamps, exclusive of concentrating mills.

#### DAKOTA.

**HARNEY PEAK TIN.**—*Rapid Republican*, June 10: A prominent citizen of Rapid, in the metropolis yesterday, informed a reporter for the *Pioneer*, that on one day last week the Harney Peak company paid out \$40,000 cash, for the purchase of tin locations, and for the privilege of renewing bonds now held by it, on tin locations in Pennington and Custer counties. The inference is that the much talked deal will yet go through, despite the fact it has dragged these many months. The appearance of several persons in the city yesterday who are said to be from London, England, and interested in the Harney Peak tin deal, caused considerable discussion on the street concerning the present attitude of the Harney company in relation to the tin interests of this section. The general impression is that the movement indicates that arrangements are being made for the commencement of work under the auspices of the English syndicate, and that the final papers of transfer from the American company have been or are about to be made. It is pretty well settled that nothing has occurred to discourage the English company from participation in the profits of tin production in the United States, and we believe that the delay which has been experienced by the people of the Hills in the development of the tin industry is due to the slow character of the English mind and the grabbing disposition of the American mind. The Americans did not care to develop until they had gobbled everything, and the English were slow to act until everything had been gobbled. Once started, however, there is every incentive to rush things.

#### IDAHO.

**SILVER MOUNTAIN DISTRICT.**—*Idaho Statesman*, June 9: They are working 80 men there now, 14 in the mines, the rest in the mill; the mine 300 feet below the surface is 30 feet wide, and they are not through yet to the opposite wall, so they do not know exactly how wide the mine is. The average ore assays \$50 to the ton, mostly silver. They expect to get the mill in operation by the latter part of August. Gold Hill and Banner mills are undergoing repairs, and will not start up under three weeks. The placer mines of Boise county have produced only about one-fifth of last year's yield, owing to the scarcity of water. The Alturas mill at Rocky Bar has run 50 stamps the past week, and has ore to keep them running. They expect to make a clean-up on this run of \$15,000 or \$20,000. The Wide West and Pine Grove mills are pushing the work along as fast as they can get lumber.

**CEUR D'ALENE.**—*Wardner News*, June 11: As the summer advances a pleasing change is visible in the appearance of all things on the South Fork, and we opine before the season is over we will witness a phenomenal growth in all our towns and a corresponding increase in all our business relations. The development of the mineral riches of the country will warrant a rapid increase in our population as they daily present opportunities for greater and more immediate profit. A gratifying fact, and one

that argues well for the substantial growth of the country, is that the people here have abiding faith in the future. They are thoroughly impressed with the immense possibilities of the country, and they are showing their faith by their works. They have set their stakes far in advance and are advancing steadily toward them. Now, that new lines of railroads are an assured fact and will reach this section, connecting it directly with the railroad system of the country, we may reasonably look for a genuine boom in all directions. The tide of immigration is wending its course in this direction, and the numbers of people constantly arriving are of that class most desirable in a mining country. Experienced miners from all directions are commencing to appear, and the universal opinion expressed by all is more than favorable to the outlook of our mines.

**SEAFOAM.**—*Keetchum Keystone*, June 16: W. H. Greenhow and J. K. Morrell returned from a protracted visit to the Seafoam and Sheep mountain countries last Wednesday. They visited and took specimens from every prospect and mine of importance in the new districts and returned with the unwavering conviction that there is sufficient actual mineral wealth there to warrant a genuine boom in the near future. They are well pleased with the result of their journey and thoroughly convinced of the reported richness of that country.

#### MONTANA.

**WEST OF ANACONDA.**—*Review*, June 14: The district west of Anaconda is now giving very substantial testimony that the good things said and published of it for the past three years in the *Review* were true. There has been two or three very important strikes during the past 10 days. The ore which is the most unexpected to the public is the ore in the river vein, owned by Oleson, Vinyard & Murray. The mine is in Oleson gulch, about nine miles west of Anaconda, and is close to the Stormway, the Silver Chain and the Antelope. The mine has only been worked a short time, the shaft being down but 100 feet, and the vein which they have been following from the surface has widened to 18 inches of ore which runs 200 ounces. In character the ore closely resembles that of the Silver Chain and Antelope. The discovery of this lode at the distance it is from these other two claims is proof conclusive that there is a continuous body of ore there and that ere long we will be able to announce other important discoveries in this district.

**TWO THOUSAND TONS PER MONTH.**—The Boston and Montana plant at Meaderville is now running in full blast for the first time, the last furnace having been started up to-day. Supt. Couch says the works will now make an output of 2000 tons of matte per month.

**HARRIS AND LLOYD PROPERTIES.**—The lead at the bottom of the shaft in the Harris and Lloyd tunnel has been crosscut 180 feet below the tunnel and is found to be about 40 feet wide. It is considerably broken, but they have some five or six feet of ore. Work commenced yesterday in sinking another 100 feet.

**LITTLE NELLIE.**—We announced last week that there was a report that a rich body had been struck in this mine, and the report proves true. The owners have very little to say, saying to us: "there is time enough by and by;" but it is known they have a vein about 18 inches, similar in character to the Blue-eyed Nellie.

**THE COMBINATION.**—It is learned from one of the trustees of the Combination Mining Co. that the mill has now been running over a week, and that General Manager Akers reports a saving of about 90 per cent of the assay value of the ores. The mill is crushing about 25 tons per day. The mine itself is looking better than ever before.

**THE HECLA COMPANY.**—*Inter-Mountain*, June 12: The Hecla Consolidated Mining Co. at Glendale are now running their full plant of three water jacket furnaces, and are now turning out over a car of bullion every 24 hours. This is a large increase of production for them as they have not crowded their plant to its full capacity for nearly three years. In consequence a large number of men are employed at the works, and Glendale business men are all doing comparatively well.

**THE BUCKEYE MINE.**—The Buckeye mine at Philipsburg is attracting a good deal of attention lately. The principal owner of the property is John Kinney, who sometime since tapped the vein which showed itself to be of considerable value. He has interested Messrs. A. A. Pickens and Geo. Ross of this city, who have formed a syndicate to explore the property, which is now under active development. Considerable water has been encountered at 50 feet, but two shifts are now being steadily worked which will be able to handle the water until a pump arrives, which has been ordered. It is the intention of the syndicate to sink to 150 feet before crosscutting. A two compartment shaft is being sunk.

#### OREGON.

**A LARGE MILL.**—*Bedrock Democrat*, June 16: It is now settled beyond any question of doubt that the celebrated Cracker creek mines of Kowles & Bourne have been sold to a St. Louis syndicate for a consideration of \$1,000,000. The new company is expected to take charge of the property at once. It is authoritatively stated a mill costing \$100,000 will be erected on the mines at an early day. The sale of these mines will do more to boom the mines of Baker county than all of the other transfers that have ever taken place in this county before. It will be the means of attracting other capitalists here; in fact, it is already given out that important transfer of other valuable properties in the immediate neighborhood of Cracker creek are being negotiated and will take place within the next few weeks.

**CORNUCOPIA.**—George Clark returned yesterday from the Dolly Varden and Hazel White mines, owned by Capt. E. M. White and situated about 8 miles northwest of Sparta. He reports them showing up fine bodies of ore, especially the Dolly Varden, from which exceedingly rich gold ore is being extracted. Mr. Clark speaks of other mines of the vicinity as showing up splendidly. He says the mine owners of Cornucopia are more encouraged than ever. The Oregon Gold Mining Co. are putting to work all the miners that can be obtained, and it now looks like superintendent Smith would yet bring "order out of chaos." Mr. Clark recently

visited Sparta, and examined the Del Monte group of mines owned and being operated by Prof. J. Gny Lewis. He says the Prof. has one of the best mines in Oregon and thoroughly understands how to operate it. The ledge is from 7 to 9 feet in width and will yield from \$40 to \$100 to the ton on an average.

**WILL BOOM SURE.**—The sales of mining property in the Cracker creek district that have already taken place this spring, and the almost certain transfer of other mines in the near future, will, without doubt, give Baker county a genuine mining and business boom before the snow comes again. We are in a position to know that large capital will be invested in Baker county within the next 60 days. Few people realize that we are on the verge of the most prosperous era in the history of Eastern Oregon, but before many days the truth of the claim we now make, that Baker county and Baker City will have a boom, will be recognized.

**BAKER COUNTY.**—*Bedrock Democrat*, June 9: The advent of mining men during the past month from the markets of New York, Chicago, Philadelphia, Boston, St. Louis and San Francisco, their favorable reports to the parties whom they represent, the alacrity with which those parties are taking hold of the opportunities presented, all point to a literal fulfillment of that prophecy. Vast sums of money have been expended here within the past two weeks and small fortunes are now in transit to be exchanged for the greater ores now lying beneath the surface of the rock ribbed and ancient hills of Baker county. The section which at this time appears to be attracting most attention lies in what is known as the Cracker creek and Cable Cove district, distant between 20 and 30 miles from Baker City, rich in mineral resources, and extensive in territory. Within the past few days, in the first named district, several important transfers, involving thousands of dollars, have been made, and we are reliably informed by parties whom we know to be in a position from which they can speak advisedly, that negotiations far greater, financially, are now pending between owner and capitalist in each of these districts. As a result of the sales already made, even, the miner in Eastern Oregon is in a hopeful mood to-day. Said an experienced miner to the *Bedrock* reporter yesterday: "There are three properties (we omit the names) in the Cracker creek district that some day will make things hum loud enough to be heard outside of the State of Oregon." It is rumored that four mills will be planted before very long in these districts. Of this, however, we have no positive assurance. But we do know that already preparations are being made for the accommodation of 100 or more miners, who are to be supplied with the latest improved mining machinery for the prosecution of their work. These and other signs point to but one conclusion, and that is that development work is soon to be engaged in that will determine what possibilities are in store for the miners of Eastern Oregon.

#### UTAH.

**REVIEW.**—*St. Lake Tribune*, June 16: The week has been dull in local mining circles, and there is unquestionably a great depression among mining men, owing largely if not principally to the lavish shipments of Mexican lead ore across the border free of duty and the refusal of the Treasury department to reverse its rulings as to these ores, so as to make the regulations conform to the law. The low price of lead is held to be mainly due to this Mexican influx, and this combined with the fact that silver is now cheaper than it has been at any previous time during this century, fills miners' minds with discouragement. The cheering lining to the cloud is that copper keeps up in price, but for most here that doesn't count. The receipts in this city for the week were to the value of \$116,030.53, of which \$79,365.83 was bullion and \$36,664.70 was ore. For the previous week the receipts were \$85,199.05, of which \$46,668.33 was ore and \$38,530.72 was bullion. The Ontario product for the week was of bullion, 22,525.91 fine ounces; ore sales, \$22,607.31; total, approximately, \$45,133.30. The Horn Silver is understood not to be selling any ore on account of the low price of lead, which is probably a wise policy. Fine bar receipts in this city for the week were to the value of \$22,525; base bullion, \$31,300. The product of the Hanauer smelter for the week was \$8500 in bullion; of the Germania, \$11,640.83.

**PARK NOTES.**—*Record*, June 16: Never before was the mining industry in and around Park City in a more prosperous condition, considering the low price of silver and lead. Old properties are steadily increasing their production and enlarging their possibilities for the future, while new concerns are springing up every day, and partially developed claims are being made to yield up the wealth that is in them. More men are at work in new channels; new and rich discoveries are constantly made.

**THE GREAT ONTARIO.**—About all that can be said concerning the big Ontario, is that it continues and will continue to pay dividends at the rate of \$900,000 a year; that the mine and mill employ about 500 men; that its product for the past six months of '88 will be about \$900,000, fully as good as any like period before, and that this bonanza is but just reaching the first stages of its prolific production.

**THE DALY'S OPERATIONS.**—This fine young property, west of the Ontario, has established its worthiness to be styled the twin sister of the Ontario. Nearly 200 men are employed at the mine developing and prospecting the ledge, and about 100 tons daily are extracted and shipped. It pays dividends at the rate of \$450,000 a year, and soon the first million will have been reached.

**ORE AND BULLION SHIPMENTS.**—On Thursday the Ontario shipped 40 bars of bullion, containing 21,454 fine ounces of silver. During the week the Crescent shipped 156,000 pounds of concentrates and 94,870 pounds of first-class ore. Last Monday 9 bars of Daly bullion 928 fine silver ounces, were shipped from the Marsac mill, and to-day the product was 8 bars. For the week just ended the Mackintosh sampler received 236,080 pounds of Ontario ore; 83,720 of Daly and 175,070 of Sampson ore; total, 394,870 pounds.

**IN SNAKE CREEK DISTRICT.**—Another rich strike was made this week in the Southern Tier group. The Rochester is about ready to make a spurt to the front, the big "fault" in the hill having been gone through, and now developments are going on in the solid formation. The ore showing is encouraging, to say the least.



## MECHANICAL PROGRESS.

## The New Process of Welding.

We have already, some months since, made reference to a new process of welding by the use of compressed oxygen, but the great cost of oxygen made the process quite too expensive for ordinary work. The cheapening of oxygen by Brin's new process of its manufacture, however, has now brought that agent to so low a price as to be made very generally applicable to welding. We find the following reference by a correspondent of an exchange without signature, but by one who is evidently well posted in the matter:

The cheapening of oxygen by Brin's process of manufacture has put into the hands of metal-workers a new power. I have recently made a few experiments with the compressed oxygen and coal gas, and found that with a half-inch gas supply a joint could be brazed in a two inch wrought-iron pipe in about one minute, the heat being very short, the redness not extending over one inch on each side of the joint.

The appearance of the surface, after brazing, led me to experiment further with welding, a process which is not possible with ordinary coal gas and air, owing to the formation of magnetic oxide on the surfaces. Contrary to my expectation, a good weld was obtained on an iron wire  $\frac{1}{8}$ -inch diameter with a very small blowpipe, having an air jet about 1.32 inches diameter. This matter requires to be taken up and tried on a large scale for such work as welding boiler plates, which, it appears to me, can be done perfectly and with far less trouble than would be required to braze an ordinary joint. The great advantage of this would be that the boilers would require no handling, but could be welded with an ordinary large blow-pipe in position, and with about one-tenth the labor at present necessary.

The cost of the oxygen is trifling, and it is evident from the results obtained in brazing that the consumption of gas would be considerably less than one fourth that necessary with an air blast, irrespective of the fact that welding is possible with an oxygen blast, whereas it is not possible if air is used.

The surface of iron heated to welding heat by this means comes out singularly clean and free from scale, and a small bottle of compressed oxygen, with a blow-pipe and a moderate gas supply, would make the repairs of machinery, brewing coppers and other similarly apparatus a very simple matter. The trouble and difficulty of making good boiler crowns, which so frequently "come down," would be very small indeed when the workman has an unlimited source of heat at command under perfect and instant control.

## Nail Production in the United States.

The total production of cut nails in the United States in 1887 was 6,908,870 kegs of 100 pounds each, against 8,160,973 kegs in 1886, 6,696,915 kegs in 1885, and 7,581,379 kegs in 1884. The production of 1886 was the largest the country has ever attained. The decrease is mainly due to the increased competition of wire nails.

In 1886 the production of wire nails was about 600,000 kegs, made by 27 wire-nail works. In 1887 the production is estimated at 1,250,000 kegs, made by 47 works. The smaller sizes of wire nails are those which chiefly compete with cut nails. The displacement of iron nails by steel nails has progressed very rapidly. In 1884 the production of steel nails in the United States (including 500 kegs of combined iron and steel) was only 383,482 kegs, or 5 per cent of the total production of nails. In 1885 the production of steel and combined iron and steel nails was 1,823,127 kegs, or 27 per cent of the total production. In 1886 the production of steel nails alone was 2,968,989 kegs, or 36 per cent of the total production; and in 1887 the quantity of steel nails produced exceeded that of iron nails.

The manufacture of wire nails in America is a comparatively recent industry, but have, notwithstanding the persistent and determined fight against them by the manufacturers of cut nails, forced themselves into a recognized position in the nail trade, and gained steadily in favor, proving to be superior for many uses to the cut nail, until there are at present an aggregate of nearly 1800 machines in use in various parts of the country. At the start, most of the machines used were of foreign make, but Yankee ingenuity was not long in proving itself equal to the occasion, as it usually does, and there are now a large number of American-made machines, of more or less importance and value. The style of nail has also been a subject which has not been overlooked, and studies and experiments have been made in adopting their shape, construction of point, the chisel point being the latest and most approved style, especially for hard wood and thin stock, as they will not split like the square or round point. At the present price of nails, it is necessary to look well to the most approved machinery. With the introduction of wire nails, and their acknowledged superiority for many uses, there is a prospect that this is to become one of the leading industries of the country.

ECONOMY OF BISULPHIDE OF CARBON AS A MOTIVE AGENT.—Mr. Charles H. Haswell read

a paper at a late meeting of the Society of Civil Engineers in which he ascribed to the performance of bisulphide of carbon in an engine cylinder a very remarkable degree of economy. The relative theoretical value of the vapor of the carbon compound as compared with that of steam being given at 5.916 to 1. Test figures which he gave showed for the motor a coal consumption of 1.385 pounds per indicated horsepower per hour. The exhaust vapor from the engine cylinder was passed through a series of surface condensers until perfectly condensed. Mr. Haswell directed attention to the fact that an entire plant designed for the development of the practicability and economy of this type of engine was constructed a short time ago at Cleveland, Ohio, for the Brush Electric Light Company. The chief objection which has heretofore been urged against the use of bisulphide of carbon has been the leakage in consequence of imperfect joints and the great offensiveness of the fumes escaping. More perfect machinery may possibly remove such objection.

GREAT CHANCES FOR THREE INVENTORS.—I have often taken occasion to remark that the world is awaiting the appearance of three inventors, greater than any who have gone before, and to whom it will accord honors and emoluments far exceeding all ever yet received by any of their predecessors. The first is he who will show us how, by the combination of fuel, directly to produce the electric current; the second is the man who will teach us to reproduce the beautiful light of the glow-worm and the firefly, a light without heat, the production of which means the utilization of energy without that still more serious waste than the thermo-dynamic now met with in the attempt to produce light, while the third is the inventor who is to give us the first practically successful air ship. The first two of these problems are set for the electrical engineer, and we may be pardoned excess of faith should it prove to be such, when, contemplating the enormous gain to humanity which must come of such inventions, we look confidently for the genius who is to multiply the wealth of the world to an extent beside which even the boon conferred by the creators of the steam engine and the telegraph will not appear overshadowing. When this inventor comes forward, and most probably not till then, it is very likely that we shall see steam superseded by a rival.—Prof. R. H. Thurston in Forum.

POLYGONAL DRIVING WHEELS NOT A SUCCESS.—It is understood that the Swinerton locomotive has not proved particularly successful, and that it has been withdrawn from active service in order that alterations may be made. The peculiar feature of the engine, as described by us recently, was the form of the driving-wheel tires, which were polygonal rather than truly circular. No less than 210 flats were milled across the tread of each driving tire. Another inventor has gone still further in this direction, and a recent issue of the *Patent Office Official Gazette* contains a patent for making shallow recesses or cavities instead of flat surfaces in the treads of tires.

SASH WEIGHTS FROM TIN SCRAP.—Building, in referring to the manufacture of sash weights from scrap tinued iron, old cans, etc., after noting the difficulty in melting such scrap safely, concludes: "The sash weights produced (from scrap) are of a superior quality." To the above a cotemporary says that there is an opinion that the quality of sash weights is measured—outside of their form and the convenience for attaching the cord—by their avoidance. Just what the tin scrap of which they are made has to do with this is something that Building should explain.

INFLUENCE OF SURROUNDINGS ON THE QUALITY OF WORK.—It is claimed to be a fact, as well settled as need be, that the highest skilled mechanics are found in those places that offer the best inducements for living pleasantly. A wise man, looking for good machinery, will seek it in a pleasant town or city, because he knows that good mechanics are there to make it. A good mechanic will seldom locate in a place subjected to unpleasant surroundings either in prospect, climate or any other circumstance.

STREET-CAR MOTORS.—A few years ago there was considerable stir in the direction of steam street-car motors but the (then) coming electric motor put them in the shade. Now it looks as if the steam car was to have its day again. As a matter of fact, the steam car has never had a fair trial, and there are many who think it is yet to be the popular surface motor.—*American Mechanic*.

THE STOVE BUSINESS.—There are 315 stove manufacturers in this country, and their expenditures in the single item of patterns amounts to \$1,317,500 per annum. More stoves are probably turned out in the United States than in all the world besides. American stoves are to be found all over Europe.

TURPENTINE and black varnish, put with any good stove polish, is the blacking used by hardware dealers for polishing heating stoves. If properly put on, it will last throughout the season.

STEEL when hardened decreases in specific gravity, contracts in length and increases in diameter.

## SCIENTIFIC PROGRESS.

## Influence of the Magnetic Field on Crystallization, etc.

We have already called attention in these columns to the singular influence of the magnetic field upon the process of crystallization, and of its remarkable modification of wire, as shown in the Fraser treatment.

Mr. E. L. Nichols, in the journal of the Chemical Society, describes a set of experiments with aqua regia, nitric acid, hydrochloric acid and sulphuric acid, to illustrate the phenomenon that when finely divided iron is placed in a magnetic field of considerable intensity and exposed to the action of the acid, the chemical reaction differs in several respects from that which occurs under ordinary circumstances. With aqua regia, it was found that the speed of reaction is greater in the magnetic field than without, and that the heat of chemical union is much greater. The production of nitrous fumes under the influence of the magnet, and the yellow color of the resulting solution, show that the reaction was modified in chemical character. With nitric acid, the effect of the magnet was to greatly increase the speed, reducing the average time from eight minutes to less than one minute. Red fumes always resulted from the action within the field. With hydrochloric acid, the rise of temperature was much smaller than in the experiments with aqua regia and nitric acid; the speed of reaction within the magnetic field differed very little from that occurring under ordinary circumstances; and the character of the reaction in the two cases was almost identical. The rise of temperature under the influence of the magnet, however, was found to be slightly in excess of that produced when the magnet was not in action. With sulphuric acid the reaction was uniform and complete, and apparently of the same chemical character within and without the fluid. The magnet was found, however, to increase the speed of reaction, and to decrease the amount of heat produced. A series of measurements was made with nitric acid, in which powdered copper was substituted for iron. The reaction in the field was found to be identical with that which occurred when the magnet was not in action. The results arrived at by the author are shown in a series of curves, the ordinates denoting temperature in degrees of centigrade, and the abscissae time in minutes. The experiments are preliminary to a more complete investigation of the novel series of effects developed.

The *Electrical World*, in noticing the above series of experiments, remarks that they demonstrate the fact that chemical action is intensified whenever substances are placed in a magnetic field, and that such effects show that electro-chemistry presents a vast field for research. In another reference to the experiments described by Mr. Nichols, the same journal further remarks that "The particular phenomenon cited was observed some time ago, and Prof. Ira Remsen of Johns Hopkins University has devoted particular attention to its study, but his results have not yet been made public. In the meantime, however, electro-chemistry is occupying more and more the attention of chemists. Roscoe and Schorlemmer, in their standard work, have begun to classify and discuss the reactions of the elements according to their position in the scale of electric potentials, and the step they have taken has proven a great help to the elucidation of the laws of chemical combination. Electro-chemical analysis, though employed to some extent even now, is destined to be of greater importance, so that the chemist of the future will also, of necessity, have to possess a knowledge of electricity. This case is the parallel of the one cited recently, in which Colonel Flad, the president of the Society of Civil Engineers, remarked in a recent address that the engineer of the future will have to be conversant with electricity as with hydraulics."

## Zinc Etching—New Process.

In the art of etching figures or designs in metallic plates it is the common practice to transfer them upon the metal from photographs or to draw them thereon with an ink capable of resisting the action of the acid employed in the etching process, which eats away the surrounding metal, leaving the design in high relief. In following this method, however, the edges of the figures become almost invariably rounded, thus not producing the desired effect in the prints produced. It is to obviate these difficulties that the present process has been invented, which claims to secure sharp edges or contours in plates either of zinc or other metals. The following is the complete description: A zinc plate having a smooth polished surface is taken, and upon it is drawn the required design with an ink composed of asphaltum, turpentine, and oil (enough to keep the composition in a liquid state), and a little lampblack to darken it. Or, if the object to be reproduced be an engraving, either stone, plate, wood or any other material, it is transferred by the usual mode—that is, by taking an impression from the engraving on "transfer paper," and thence to the zinc plate.

The transfer ink used is a compounding of ordinary lithographic-printing ink and asphaltum, in the proportion of about one-third of the latter to two-thirds of ink. The drawing or transfer having been completed, and before the

ink has become dry, it is covered with a coat of powdered resin or copal, the hack of the plate being also coated with asphaltum to render it acid proof. The plate is now ready for the bath, which consists in muriatic acid of about 1.2 specific gravity (or other suitable acid, either in their pure or diluted state, such as nitric acid, etc.), where it is allowed to remain about five seconds. It is then taken out, washed, dried, and when dry heated only enough to melt the powdered resin or copal, so as to form a crust, which will protect the edges of the drawing or transfer, which have been formed by the first exposure of the plate to the etching agent. The plate is next returned to the bath of muriatic acid, again allowed to remain about five seconds, and washed and dried once more. Those portions which are high enough to print are then covered with asphaltum, and another coat of powdered resin or copal is added, after which it is replaced in the bath and allowed to remain until sufficient depth is obtained on the exposed parts. These operations of covering the plate and returning to the acid may have to be repeated three or four times, according to the nature of the work. The plates used are, of course, restricted to such metals as are affected similarly to zinc. The process will doubtless prove a considerable advance upon present methods.—*Paper and Press*.

OUR TEARS.—Tears in redundancy may strikingly express emotion, but that is a mental side, which is but a small part of their function, as we shall see. The principal element in the composition of a tear is, as may be readily supposed, water. The other elements are salt, soda, phosphate of lime, phosphate of soda and mucus, each in small proportions. A dried tear seen through a microscope of good average power presents a peculiar appearance. The water, after evaporation, leaves behind it the saline ingredients which amalgamate and form themselves into lengthened cross lines and look like a number of minute fish bones. The tears are secreted in what are called the "lacrimal glands," situated over the eyeball and underneath the lid. The contents of these glands are carried along and under the inner surface of the eyelids by means of six or seven very fine channels, and are discharged a little above the cartilage supporting the lid. The discharge of tears from the lacrimal gland is not occasional and accidental, as is commonly supposed, but continuous. It goes on both day and night—though less abundantly at night—through the "condits," and spreads equally over the surface of the pupil, in virtue of the incessant movement of the lids. After serving its purpose the flow is carried away by two little drains situated in that corner of each eye nearest the nose—into which they run—and called the "lacrimal points." The usefulness of this quiet flow of tears to both men and beasts, is manifest. There is such an immense quantity of fine dust floating in the air and constantly getting in the eyes, that, but for it, they would soon become choked. Very little is requisite to keep the ball free, and when some obnoxious substance—smoke, an insect, or the like, that affects the nerves—does make its way in, an increased flow is poured out to sweep it away.—*Ex.*

THE COURSE OF MATERIAL PROGRESS.—A comprehensive review of the economic changes of the last quarter of a century, and a careful balancing of what seems to have been good and what seems to have been evil in respect to results, would seem to warrant the following conclusions: That the immense material progress that these changes have entailed has been for mankind in general, movement upward, and not downward; for the better and not for the worse; and that the epoch of time under consideration will hereafter rank in history as one that has had no parallel, but which corresponds in importance with the periods that successively followed the Crusades, the invention of gunpowder, the emancipation of thought through the Reformation, and the invention of the steam engine; when the whole plane of civilization and humanity rose to a higher level; each great movement being accompanied by social disturbances of great magnitude and serious import, but which experience proved were but temporary in their nature and infinitesimal in their influence for evil in comparison with the good that followed. And what the watchman standing on this higher eminence can now see is, that the time has come when the population of the world commands the means of a comfortable subsistence in a greater degree and with less effort than ever before; and what he may reasonably expect to see at no very remote period is, the dawn of a day when human poverty will mean more distinctly than ever physical disability, mental incapacity, or unpardonable viciousness or laziness.—*Manufacturer and Builder*.

TO DETECT DAMP WALLS.—A very good way to test if a wall is damp (as suggested by Nessler) is to pin a thin sheet of gelatine on it by one end. The thin sheets of French gelatine used for making jelly will answer. If the wall is damp the gelatine sheet becomes curved, its convex side being against the wall.

THE AUTOGRAPHOMETER is the name of a newly devised instrument designed to autographically record the plan of the ground over which it is dragged. It can be carried about on a light vehicle, and when in use indicates the topography and difference of level of all places over which it passes.



## GOOD HEALTH.

## A Scientific Method for the Cure of Stammering.

Noticing the announcement of Prof. J. Whitehorn the other day, a reporter of the *Los Angeles Times* had his curiosity aroused as to this method for the treatment and cure of stammering, paid a visit to the professor's rooms, and made an investigation of this very novel branch of physiological science.

The reporter was informed that the seat of the trouble is generally in the articulatory organs or in the breathing organs. If there is an insufficient control over the diaphragm or over the muscles of the jaws or lips, or all three, that causes stammering. Again, it may be trouble with the tongue or muscles of the throat—that causes stuttering and lisping.

The diaphragm is a membrane which stretches transversely across the body between the stomach and the lungs. The rising and falling of this diaphragm by muscular contraction and expansion acts like a bellows, drawing in air and expelling it from the lungs. The dilation and contraction of this diaphragm is automatic and involuntary. We breathe asleep as well as awake; we breathe without thinking about it or willing it. Sick or well, drunk or sober, that useful but little appreciated organ works faithfully along and keeps us alive. Well, the diaphragm, while the least liable to disarrangement of any organ of the body, is still subject to some little eccentricities. Sometimes it throws in a few extra, spasmodic contractions and expansions, and plays the most fantastic tricks with our breathing. We call that hicoughs. Sometimes it gets into the way of playing these pranks on us just when we are in the act of speaking. The lungs are filled or partially filled with air, which we must expel to create the vocal sounds. The diaphragm, instead of rising to its convex form with an even and steady motion, comes up with a series of jerks and twitches, or rises half way and stops a second or so, and goes down again. That checks the flow of air through the glottis, the organs of speech cease to vibrate, or they vibrate spasmodically—and we stammer.

A very common mistake with stammerers is that they begin to talk with their lungs only half filled. That only exaggerates the tendency to a spasmodic action of the diaphragm.

And how do you treat this very peculiar malady? asked the reporter.

Well, in the first place, I have to show a man how he can gain absolute control over his vocal organs. I generally begin by making him maintain absolute silence for a week or ten days—sometimes the period is extended to 18 or 20 days.

And that is about the toughest job of all, put in one of the professor's pupils who sat by, speaking with somewhat painful deliberation, but without a stammer.

Then my next effort is to teach a patient how to breathe.

Here the professor stood up and exemplified the exercises which he imposes on his pupils. Closing his lips, he inhaled air through his nostrils until it seemed as though he must have filled himself down to his boot tips. Then holding the breath he tapped himself lightly with his finger tips on every part of the chest. That was to force the air into the remotest parts of the lungs and expand all of the air cells. Physiologically considered, the process also depressed the diaphragm to its lowest possible point and held it there steadily. After maintaining this inflation until he began to grow a beautiful maroon in the face, the professor expelled his supercharge of breath with a rush. The month being wide open as in the position of gaping, it was noticeable that the soft palate drew up into the roof of the mouth, and the base of the tongue was depressed, allowing a free opening for the passage of air. Then, after the breathing organs had emptied themselves as thoroughly as possible in a natural way, he placed his hands upon his body about the base of the chest (over the region of the diaphragm) and squeezed himself like a woman tightening her corset, and there was a still further discharge of breath, half as great as the first. That of course involved a full dilation of the diaphragm in a steady and deliberate manner. Thus, without exercising the vocal organs at all, the lungs had been completely filled and emptied, and the diaphragm had been put through its paces in regular form, and shown exactly how it ought to act. The professor explained, as soon as he had recovered his breath, that every organ of the body, like the body itself, is a creature of habit. If you get it into the way of doing right, the most natural thing in the world for it is to do right. Even the diaphragm may be educated.

The next effort, continued Prof. Whitehorn, is to get the mind to properly control the organs of speech. There are, as nearly as I can diagnose it, five speech centers in the brain. These must be in supreme command of their respective functions. They must issue their orders systematically, quickly, correctly, and their orders must be obeyed.

At first we have to forego the point of quickness, and the speech centers must issue their orders deliberately and carefully. Here the parlor organ comes into play.

Then the professor took his seat at the organ and again exemplified his exercises. These consisted of striking a note, with which the voice was required to sound a note in accord. This

note is sounded deliberately and steadily to the full capacity of the pupil's chest. Then it is repeated and repeated, until the note from the throat is as steady and even as the note from the instrument. Then comes a word instead of a note, and that must be uttered in the same measured tone. Then two or three words follow with musical deliberation, and finally a whole sentence, after the manner of a Catholic chant. A variation of this musico-vocal exercise is to sing the words up and down the scale, always accompanying the instrument, and always exercising the greatest deliberation.

After the training at the organ comes reading and declaiming exercises, the treatment being exactly the same as for voice building and elocution. There are also calisthenic exercises to strengthen and develop the muscles of the throat and chest. In this course the lungs are expanded, and as a purely hygienic treatment it is good, toning up the system and increasing the vitality. One object of holding air in the lungs as long as possible is this: The longer the air remains the warmer it gets and the more it expands the lung cells. If a man would follow this treatment scientifically from youth up, he would never die of pulmonary consumption.

How long have you followed this profession of curing stammerers?

About eight years.

And what has been your measure of success?

I have cured every case that has been subjected to thorough treatment except one.

The professor here took a scrap-book from the table and showed numerous written testimonials, in which the writers acknowledge complete cures from the unfortunate habit. A notable instance was that of a man who had been cured after stammering 40 years.

**THEATER AIR.**—An interesting account has been given by Osomo J. Burton of the amount of carbonic acid and organic matter in the Theater Royal and the Royal Lyceum theater in Edinburgh. At the time of the experiments the theaters were by no means full, nevertheless the temperature was from 10 to 15 degrees above that record immediately before the houses were opened, while carbonic acid was multiplied from three to five times. Mr. Burton remarks that the vitiation of the air proceeds with extraordinary rapidity at first, but the rate of change soon decreases till toward the end of the performance the air becomes little or no worse, and, indeed, in a few instances, it appeared to slightly improve. The air of the gallery was worse than that of any other part of the house; the amphitheater, dress circle and pit did not come in the same order as to degree of impurity in the experiments, but the pit was always worse than the dress circle. Headache and vertigo are produced when the amount of carbonic acid in the air of respiration is not more than from 15 to 30 volumes per 10,000. The facts as to all theaters ought to be known, for the public had much better lose an evening's enjoyment than submit to the enforced inhalation of a polluted atmosphere for a number of hours. —*London Lancet.*

**THE BANANA AS FOOD.**—According to one authority, one pound of bananas contains more nutriment than three pounds of meal or as many pounds of potatoes, while as food it is in every sense superior to the wheat bread. Although it grows spontaneously throughout the tropics, when cultivated its yield is prodigious, for an acre of ground planted with bananas will return as much food material as 33 acres of wheat, or over 100 acres of potatoes. It is not generally understood that bananas—fried, baked or roasted—are very appetizing, and that, sliced and placed in a dish with alternate slices of orange, they make a most delicious desert. In the West Indies, where they are grown in profusion, as elsewhere, they are much esteemed as food, and being easily obtained nearly all the year round, they are justly looked upon as being a great dainty by the natives.

**THE USES OF THE EUCALYPTUS TREE.**—The uses to which the products of the eucalyptus tree are put are annually becoming more varied and valuable. A very good cement is now made from the gum of the trees and is being introduced in the local market. From the leaves and tender branches there is compressed a substance used largely by engineers in steam boilers for the prevention of scale. Then, too, the nuts or acorns are, by powerful pressure, made to give forth an oil of which many medicinal preparations are made, chiefly liniment, ointment and lotions. A local manufacturer of rustic furniture for arboreal, summer houses and ornamental grounds says he finds the limbs of the old trees and the trunks of the young ones especially adapted to the purposes of his trade.

**NOT AN INFALLIBLE TEST.**—A "test for sewer gas" has been going the rounds of the papers which deserves notice on account of its misleading character. It consists in exposing to the suspected atmosphere pieces of paper moistened with a solution of sugar of lead, which are supposed to indicate the presence of the dreaded gas by turning black. This test is entirely unreliable, and only indicates the presence of sulphuretted hydrogen, a very disagreeable gas, but not especially dangerous in small quantities. There is no definite test for sewer gas known, and it is much better to avoid all possibility of its presence than to depend upon any chemical tests for indications of its existence.

## USEFUL INFORMATION.

## The Mesquit Bean Tree.

In Arizona and portions of Southeastern California, there grows a tree called the Mesquit bean tree, the timber of which is especially suited for that exceptionally dry, hot climate. When made into felloes for wheels it will not shrink, even if newly cut, as its sap is of an oily nature like lignum vitae. This wood is dark in color, hard and knotty, and rather rough to work. It is valuable, not only as wagon timber, but because it produces a large crop of beans which when ripe drop off and are harvested with a rake. The beans are about ten inches long and quite thin, and about half an inch wide. The seed or bean proper is very small, but the pod and pulp is very sweet and the Indians use them for food, grinding the pods up into flour. The Moqui Indians make this flour into tortillas and bake them on a flat stone from which their fire had been swept. The tree grows in the sandy deserts, but thrives best in the sinks of streams, or ancient riverbeds where, as it forms an obstacle to the drifting sands, great sand hills accumulate around the trunk, from the top of which the branches spread out luxuriantly. When wood is wanted by the teamster to rim his wheels, or by the settler for fuel, the trunk or larger branches have to be dug out, recalling the complaint of an Irishman in Arizona: "Begad it's a queer country where a man has to take a shovel wid him to git firewood and a hoe wid him to cut hay" (the gietta grass).

It is surprising that this wonder of the vegetable kingdom has not been systematically cultivated in Southern California. It will grow anywhere there with small care, and in addition to its value as a wagon hardwood, furnishes shade, fence, fuel and forage, for the beans are excellent food for sheep or hogs. What the Carahua tree is to Cyprus and the shores of the Eastern Mediterranean the now neglected mesquit may yet become to Arizona and semi-tropical California.

## Choosing Wall Paper.

In choosing wall paper great care should be exercised, as the color and general appearance of most of the patterns change very greatly under gas or lamplight. It is, therefore, desirable to select three or four patterns, put them up on the walls of the room and examine their general effects carefully by day and night before making a final choice, for not only do some patterns and colors materially alter by artificial light, but some, especially green and blue, absorb an immense amount of light, and are, therefore, not fitted for any rooms which are to be economically lighted. In papering the walls of a dining-room there are, of course, very many ways of treatment, and among the numerous good examples of paper-hanging now made, there should be no difficulty in selecting some really good patterns, artistic in design and coloring. As before stated, a dado or wainscot forms a desirable basis for a dining-room, a wide frieze a proper finish to the wall instead of carrying up the general tone of color of the wall to the ceiling or cornice; this suggests itself as infinitely more artistic than carrying up the same color or decoration to the top of the room, and thus making a sudden break without any gradation of color between it and the ceiling, excepting, of course, in cases where the ceiling is very low; then the treatment must be made without either wainscoting or frieze. When a plain color is desired as a background for pictures, the very cheapest and commonest paper often makes the most artistic and serviceable finish; the yellow-gray, gray-brown, and yellow brown common wrapping paper—the coarser the better—makes a very effective and cheap covering for a wall. This paper can be bought by the roll.

**CULTIVATE THE USE OF THE LEFT HAND.**—Many are the advantages missed by the non-cultivation of the left hand. Occasionally an artisan is seen who is equally able to handle tools with either hand. Such a one has constant advantages over his fellows, not only in the avoidance of fatigue, but in doing nice work and overcoming with ease difficulties that present themselves to those skilled with only one hand. The man who can use a hammer or knife or perform any other feat with the left hand at the same time that the right is busy will find frequent occasion to exercise his skill. Another and important reason for training the left hand to act with as great ease and precision as possible is that if injury occurs to the right hand the left can exercise readily all the functions possible to one hand, unaided. By training the left hand in you have one would be spared, in such a case, from spending much valuable time in educating muscles hardened by age and unaccustomed to obey the mandates of the will.

**THE PERFECT HORSE.**—I want a horse about 15.02 in height, and weighing about 1000 pounds, for ordinary use. The horse's head should be a spirited, cheerful, cerebral organization, for a horse has moral as well as physical qualities. His forehead should be broad, and his eyes cheerful. He should not have a bulging but a prominent eye. His face below the eye should be chiseled in a graceful and strong way. His nostrils should be wide. An awkward mouthed horse should be avoided, for such a horse betrays an awkward brain. An arched, well-

shaped neck and long throat should be required. Other requisites are a well-rounded shoulder; a short back, as long as you like underneath, as short as you can get it on top; a leg not too long nor too short; a short foreleg; the portion near the knee broad; a strong pastern, well proportioned; a healthy foot, the hoof being round and well proportioned; a hock free from swelling. —*Dr. H. B. Loring.*

**THE CIVILIZING POTATO.**—The potato has been a great civilizer. It commenced its work 300 years ago as a native American, and it has gone all over the world, doing its work in all lands quietly yet steadily, and in two ways—first, by being so cheap and abundant that everybody came to like it; next, by failing until everybody missed it and went to hunting all over the world for it. In 1880 this country produced about 170,000,000 bushels of potatoes. To day we are importing potatoes from Germany, Belgium, Scotland, England, Ireland. Our potato crop failed in a great degree last year because of drought in the West and long continuous rains in the East. Hence, we are importing potatoes and paying a duty of 15 cents per bushel on them besides freight. If there been a total failure of the potato crop we would have ransacked the world for them, for now we must have them however high they come. This shows how the potato has become a civilizer. We are short 20,000,000 of bushels, and must call on the world to make up that shortage. Generally, England is short on potatoes. Luckily this year she and all Europe have a surplus. Next year the situation may be reversed. Ireland ran out of potatoes in 1847, and commenced starving until we supplied her. Six years ago we had a great failure, and Ireland supplied us. But the year before that England and Ireland had to import potatoes. So the potato appears and disappears, to teach the world mutual dependence. The original potato still flourishes in an island off Chili, a gnarled and diminutive tribe, the ancestor of a long and prolific and beneficent line. —*Exchange.*

**THE HOUSE FLY** is a very thirsty animal, and it is said that it cannot go over 36 hours without water at hand; so one of the simplest of observances of the vigilant housewife is to keep no liquids around in anyway accessible to them. They are in this way easily kept away from rooms where food need not be, and the rooms do not have to be shrouded in Semi Egyptian darkness to keep them out, either. The early fly, like the early worm, is, after all, the easiest to catch, the hardships being all in the "up-and-at-it" part of the performance. They come in scant numbers, big and lazy here in March. One finds no trouble in catching them one by one with the fingers. By May they get lively and saucy—too numerous by far, unless kept down by an occasional dose of "huhach" or persistently trapped. Here is a recipe for a good fly exterminator: "Take half a teaspoonful of black pepper, one teaspoonful of brown sugar, and one teaspoonful of cream; mix them well together, and place them in a room on a plate where flies are troublesome, and they will soon disappear." —*Rural Californian.*

**COCOA AND CHOCOLATE.**—The cocoa or cacao tree is an evergreen, said to resemble a young cherry tree. The flowers grow in clusters; the pods are not unlike cucumbers in form, and of a yellowish red color. They contain from 20 to 30 nuts about the size of almonds, containing each two lobes of a brownish hue. After the seeds are freed from the pods they are dried, and then are either simply bruised or are crushed between rollers. Chocolate is also produced from the cacao tree. The seeds are gently roasted, shelled and reduced to a paste, when various spices are added. It is put into molds, and improves by keeping.

**SAND ON THE TRACK.**—Experiments have recently been made in England with a view of proving that a small jet of sand thrown by compressed air or steam directly under the tread of the driving wheels is better than a larger quantity thrown over the entire width of the rail. If the only end to be reached is one of adhesion in starting a train, the smaller quantity of sand will no doubt do, but in case of danger with a slippery rail the larger quantity is necessary. The experiments will doubtless result in improved methods in the treatment of rails to secure the adhesion of the driving-wheels. —*Practical Mechanic.*

**TO PRESERVE BUTTER WITHOUT ICE.**—Put your butter in a small bowl, set this in the deep saucer of a flower-pot, turn the flower-pot upside down over the bowl of butter; plug the hole in the pot with a cork; keep the saucer filled with fresh water, and the evaporation will preserve your butter without ice.

**INK FOR HAND STAMPS.**—To make an ink for hand stamps that will not injure the rubber, mix and dissolve two to four drams aniline color, 15 ounces alcohol and 15 ounces glycerine. The solution is poured on the cushion and rubbed in with a brush.

**A WOMAN'S INVENTION.**—Vanderbilt paid Miss May Tillinghast \$30,000 for inventing a new kind of tapestry hanging for his house.

**ELECTRICAL PATENTS.**—There were 1248 patents of an electrical nature issued in this country in 1887.





A. T. DEWEY. W. B. EWER.

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W. B. EWER.....SENIOR EDITOR

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SAN FRANCISCO

Saturday Morning, June 23, 1888.

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## Business Announcements.

[NEW THIS ISSUE.]

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Hardware—Huntington Hopkins Co.  
Brass and Bell Foundry—W. T. Garratt & Co.  
Mining Machinery—Union Iron Works.  
Mines Wanted—C.  
Diamond Setter—A. L. Ott.  
Dividend Notice—S. F. Savings Union.  
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Real Estate—Santa Ynez L. & I. Co.  
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Iron Pipe—Francis Smith & Co.  
Dividend Notice—German Savings & Loan Society.

See Advertising Columns.

## Passing Events.

We devote a large amount of space this week to a description of the Lick Observatory, which, having been completed, will, in a few days, be formally delivered to the University of California by the trustees, who have built and equipped it. As it stands it is now the most complete astronomical observatory in the world.

The great mortgage suit against the Sutro Tunnel Co. has been compromised and settled. The suit was for \$1,600,000, but the settlement, it is understood, was for \$900,000.

The failure of Savage, Son & Co., the pioneer foundrymen of this city, is greatly to be de-

plored. All the existing contracts, are, however, to be completed. The failure was due to large expenditures incurred in extending this business.

The Cogswell Polytechnic College is almost completed, and it is now announced that it will be opened by Aug. 6th.

For the first time in California a building was illuminated with natural gas this week. The Crown Mills at Stockton obtained an abundance of natural gas from a 1000-foot well, which was sunk on the premises. The gas is also used as fuel under the furnaces.

## Gold-Bearing Deposits that Should be Worked.

We have in these columns often alluded to the widely varied character of the gold-bearing deposits found in California, some of these being primary and others secondary formations. Belonging to this first class are our auriferous quartz lodes, and to the second our placer deposits, resulting for the most part, from the disintegration and eluviation of the quartz lodes. These deposits are wide-spread and multifarious. They are found in all parts of our principal gold fields, occurring sometimes under conditions so strange that they excite alike our curiosity and wonder. Hardly anything in nature is calculated to awaken a deeper interest than the "Dead river" system of California. The mysterious history of these rivers appeals the more strongly to the imagination just because we do not know when or how they perished.

To the matter-of-fact man the gold these extinct rivers contain will, however, prove their greatest attraction. Where do they carry the most treasure and how can it best be reached is with the practical man the great question; nor is it one that can always be easily solved. The exploration of these Pliocene channels is generally an expensive and very often a difficult and hazardous work. In most cases long tunnels have to be run to open them, it being sometimes impossible to drive these adits on the proper level to reach that end. Occasionally when properly opened the channel fails to pay, or the pay stratum before being worked out dips below the tunnel level, cutting off the drainage. Working under ground and in the dark with hard rock and water, and many uncertainties to contend with, this branch of mining is beset with as many difficulties as almost any other.

There is in the province of placer mining another class of deposits that appear to have been singularly neglected. We refer to the tailings which in such great quantities have gathered in the gulches and river channels, the greater part of them coming originally from the hydraulic washings. The most of these deposits, it is true, contain comparatively little gold and are incapable of being handled to advantage, owing to lack of outlet. Such is the case wherever these tailings have lodged in the beds of the larger rivers or in the gulches and canyons that have but little fall. It is estimated that over 50,000,000 cubic yards of this material rest in the beds of Bear river and its tributaries, and even a larger quantity in the beds of the main Yuba. But nothing probably can ever be done with it owing to the causes above mentioned. For its bulk it contains but little gold, and there is nowhere fall to be had for moving it. There seems, in fact, to be but two large deposits of this kind in the State against which these objections do not lie; one of these rests in the basin of Slate creek, Sierra county, and the other in Shirt Tail canyon, Placer county.

While the deposit at neither of these localities is so large as that on the Bear or Yuba river, the material is rich and there exists at both places good facilities for moving it, this remark being especially applicable to the Shirt Tail canyon deposit. Precisely how much of this waste stuff there is in either of these localities we are not advised, though the quantity reaches many million cubic yards. It would really seem as if by this time something ought to have been done with these tailings. In a few instances where some of the smaller deposits have been washed over they have paid remarkably well. That these larger accumulations if worked would yield equally well admits of no doubt.

That something has been gained by deferring this work of rewashing is probable. The longer these tailings are left exposed to the action of the elements, the more they become disintegrated, or, as the miners term it,

"slacked." Portions of them consist of cemented gravel rich in gold, but which only years of this "sleeking" process can dissolve setting the precious metal free. A great deal more gold could therefore be gathered from them now than could have been done had a second washing taken place many years ago. Not only so, but the longer this material is left in these canyons the more it becomes concentrated, the lighter and more worthless stuff being carried away by the water while the gold is left behind. The bed of the stream becomes a great sluice, doing its work slowly but efficiently and without any aid from man. But these natural processes, so long in operation, having accomplished about all they are capable of doing, it is time the business of gold gathering were here accelerated by recourse to artificial means. If the owners of these properties have not the money to put them in shape for active production, they ought to have no trouble in getting enough to effect that end. We don't know where capital could look for a better investment.

## Our Special Edition.

We print this week a 32-page edition of the MINING AND SCIENTIFIC PRESS, devoted mainly to a description of the Lick Observatory. The description of the Observatory and its appliances will be found very complete. The details of construction of the great dome are here given from drawings. In fact this is the first detailed description of the Observatory as a whole which has been published. The numerous engravings will convey a better idea of the Observatory and its appliances than words. Some of these engravings we have had made direct from photographs to ensure accuracy. In scientific matters, especially, accurate representation is of importance to many. The photoplates printed in this edition are photo-facsimiles, made direct from negatives without redrawing. While not as clear in detail as a photographic print, they represent the instrument photographed exactly as it is.

We feel assured that our efforts to present a complete description of this California Observatory will be appreciated. Containing, as it does, the largest telescope in the world, and the most complete equipment of any similar institution, it has become famous before active practical work has been commenced. We have refrained from publishing this edition until the observatory was complete and ready to be turned over to the Regents. The informal transfer was made a few weeks since, and on the coming Wednesday the formal ceremonies of transfer will occur.

This edition of the PRESS will give to the reader not only a general idea of the importance of the observatory itself, but will give interesting details of the appliances and the operation of the instruments. It will serve for reference at all times, as dimensions, etc., are correctly given. The biographies of the gentlemen who are to do the work are published. Most of the observers are already on Mt. Hamilton preparing for active scientific work.

For a number of the engravings we are indebted to Prof. Holden, by whose permission the blocks were used. They were made for "Vol. 1, Publication of the Lick Observatory," a work issued by the Lick trustees, and which is not for sale. Much of the descriptive matter relating to the instruments and buildings has been compiled from the same source. Prof. Holden has furnished all the information asked for from him, and has done it in so pleasant and prompt a manner, that we feel indebted not only for his kindness but his courtesy as well. We have received assistance also from Mr. Keeler, Mr. Barnard and Mr. Hill of the Observatory staff, Mr. Fear of the Union Iron Works, and Mr. Burckhalter of the Chabot Observatory. Mr. Matthews, secretary of the Lick Trust, gave us permission to use any of the photographs made by him, and Mr. Taber, the photographer, furnished the prints desired. In fact all to whom we applied for assistance in getting up this edition very kindly complied with the request.

The expenses at the Con. Cal. and Virginia mine for May amounted to \$209,550.76, and included \$48,992.25 for salaries and wages, \$30,360.04 for mine supplies, \$94,780 for reduction of ore, \$10,192.84 for bullion tax, \$13,540 for Sutro tunnel royalties, and \$1311.75 for transportation and hauling.

## Investing in Fancy Shares.

The New York Financial and Mining Record in a recent issue asks through an editorial heading "Why not Invest in Sound and Conservative Mining Enterprises?" citing numerous examples of mining properties, arguing in favor of such investments. Among these is the Consolidated California and Virginia, selling at \$11, while it pays a monthly dividend of 50 cents per share—a yearly interest of more than 50 per cent—also the Eureka Consolidated and the Standard doing nearly as well.

If, while the shares of these companies are selling at prices that really ought to attract buyers, these sales are yet limited in amount, this finds explanation, perhaps, in the fact that these several companies have a bad habit of intermitting their dividends for long periods, sometimes substituting assessments in their place. It is this unhappy feature of the business that tends to discourage investments in this class of securities.

What the Record has to say in extenuation of mining share deals as compared with certain other speculative transactions is more to the purpose, such comparison inuring to the great advantage of the former. As our contemporary remarks, the most damaging of these mining deals had their origin in the exchanges established for promoting gambling operations in telegraph, railroad, petroleum and other speculative stocks, in some of which the movements have been so infamous that the worst of these mining proceedings become respectable beside them. The manner in which the members of these institutions plundered their clients was hardly better than open robbery. The business of cheating shareholders was reduced to a system, railroad wrecking being one of its well-recognized features. The money invested in railroads prior to 1879, amounting to the enormous sum of a thousand million dollars, was nearly all lost through foreclosure of mortgages on these properties, which were bid in by the syndicates formed for the purpose, and who had planned these proceedings throughout. According to the Record, more than 14,000 miles of railroads, with all their rolling stock and appurtenances, were in this manner passed from the ownership of the shareholders to that of these robber leagues, the whole business having been accomplished during the few years preceding 1879. Aggregate all the losses that meantime came through mining investments and they shrivel into absolute nothingness compared with those resulting from these monster frauds.

Nor did this era of railroad wrecking end with the year last mentioned. In the year 1881 as many as 29 railroads, covering a linear extent of 2617 miles, with a total capital stock of \$51,277,661, and a bonded debt of \$76,644,936, were sold out under like foreclosure proceedings, with a loss of all the stock and part of the money covered by the bonds and floating debt. Since 1881 financial disasters from this same cause, though somewhat diminished in extent, have been steadily going on; and yet, despite these losses, money is easily obtainable for building railroads, nearly 10,000 miles of new road having been constructed last year. Millions upon millions have been lost through speculation in telegraph and petroleum shares, but notwithstanding this the wires continue to be put up and the oil wells continue to be put down, the same apparently as if every dollar ventured in these stocks had returned a profit.

So has it been and so will it continue to be with mining, for the reason that the business as a whole has been profitable, and because it is being steadily purged of the abuses that have heretofore tended to bring it into disrepute. As in this, so with our other leading interests and industries, there is reason to believe the gambling spirit is beginning to subside, and that less money will hereafter be lost in stock speculations than has happened during the past 20 years. There is, evidently, a growing tendency on the part of all classes to invest their means in land, or solid manufacturing pursuits, rather than in stocks of any kind. This is a healthful sign, and should this disposition to gamble meet with general abandonment, the ill-gotten gains of the speculators will be greatly diminished while the common prosperity will be advanced in a corresponding degree.

The Northern Pacific train was robbed near Billings, M. T., on Sunday last.



ing vertically through holes in the ceiling and floor work the lavers by which the shutters are opened. All the mechanism is within the building, between the roof and ceiling, and consequently protected from the weather. These shutters are perfectly weather-tight, stand at all points of partial opening, and were invented by Mr. Thomas Fraser. A round aperture in the wall below the south shutter allows the meridian mark on a pier 80 feet to the south to be viewed with the meridian circle telescope.

#### The Transit House.

The transit house adjoins the meridian circle house, into which it opens through the vestibule in the base of the ventilating tower, by a door in the east wall. It is built of iron, with a wooden lining, after the manner of the meridian circle house, but the air spaces are smaller, and no means of access to them are provided. The transit occupies the center of the inner room, which measures 18 feet in an east and

partitioned off from the east end of the building and communicating by another door with the laboratory. The south end of the hallway contains a small stove.

The laboratory is 13x12 feet. It is lighted by two windows, one of which is of red glass, in the west end. Both are provided with shutters. Immediately below the windows is an iron sink with water supply. On the north is the brick pier which supports the plate-holder of the photoheliograph. The sides of the laboratory not otherwise occupied are fitted with shelves for receiving chemical reagents and photographic materials.

#### The Dwelling-Houses.

The astronomer's dwelling consists of a brick building 63x60 feet and three stories high, situated on a level piece of ground, excavated for the purpose, to the eastward of the observatory and about 22 feet below the summit. A long flight of steps leads up from the lower plateau

tendent. One large cottage and two smaller ones are but a short distance off, with sheds for poultry, etc. A little further away on the road to the reservoir is a large barn, with stables, and west of this a long, low house which has been used by workmen. These buildings are either painted white or whitewashed.

On the observatory plateau, east of the main building, wooden shops have been temporarily erected for the convenience of the builders. The largest is 28 feet square, and is used as a carpenter shop. It also contains a lathe, drilling machine, pipe-outter, etc.

Adjoining is a small shed used as a paint-shop. A blacksmith shop, with forge and necessary tools, is situated farther to the southward, close to the great dome. These buildings will shortly be torn down and a substantial brick structure will be built on the plateau.

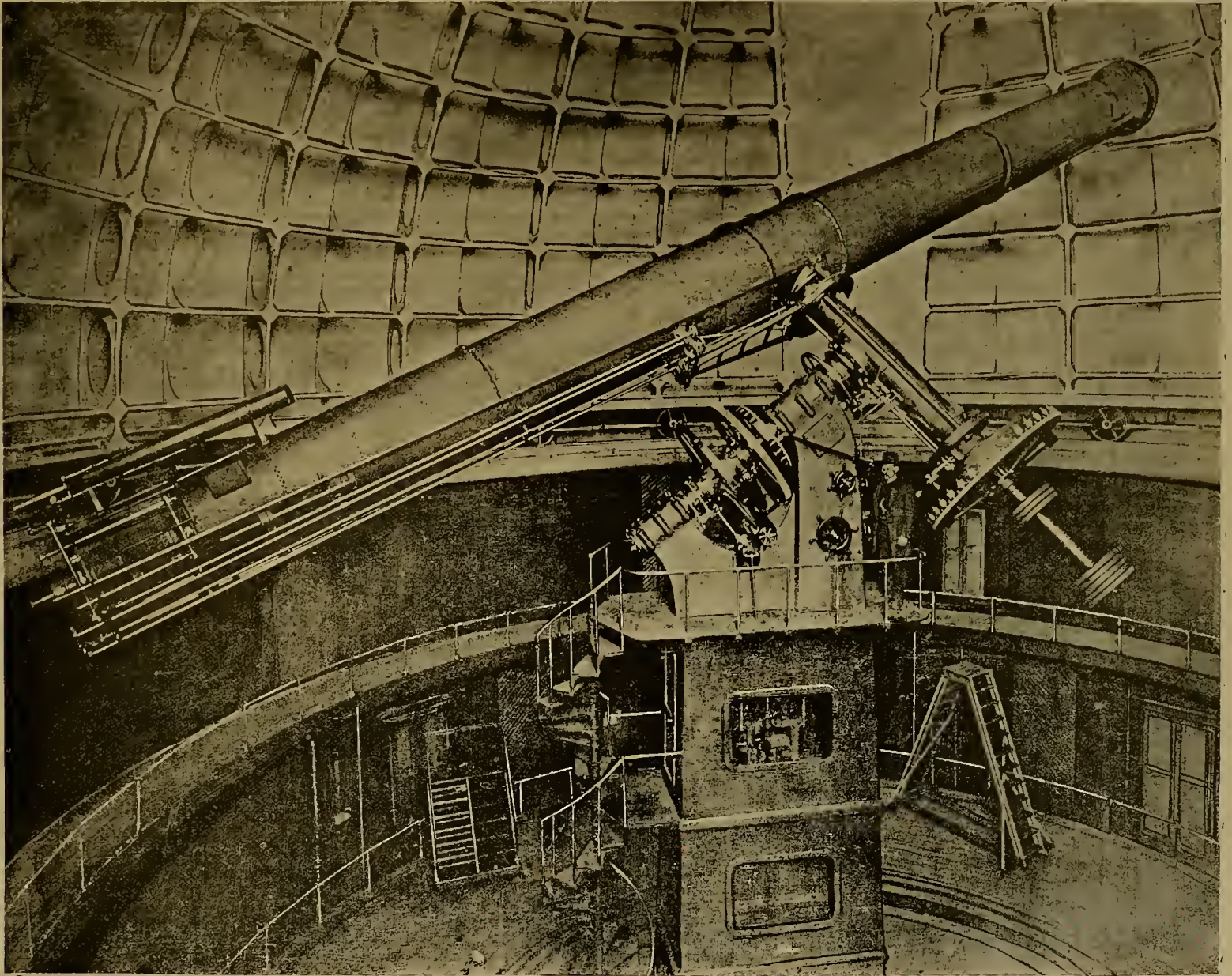
#### Description of the Water Supply.

The principal source of water is a spring, sit-

on Huyghens' peak is filled from the main one on Kepler by means of the 1½-inch pipe above mentioned. In addition to these reservoirs, four wooden tanks, two of 5000 gallons each, one of 2000 gallons, and one of 1000, collect the rain-water from the roof of the meridian circle house. The valves for controlling the supply from the large reservoirs are in a small brick house near the double cottage on the saddle of the mountain.

During the summer of 1886 a third reservoir, to contain about 30,000 gallons, was built on Mt. Copernicus, 170 feet above the observatory floor and 4000 feet distant. This can be filled either directly by the steam pump at the springs, or by a wind-mill pump erected on the Huyghens' peak reservoir. The water from this source will serve to turn the large dome and to elevate its lifting floor, as well as to run the laths and other tools on the summit. It is also an important safeguard against fire.

During the summer of 1887 a reservoir hold-



THE GREAT LICK TELESCOPE IN ITS POSITION ON THE PIER UNDER THE DOME.

west and 14 feet in a north and south direction. The roof is arched, and the central opening is covered with a curved shutter, which is controlled by levers inside. Sliding shutters on the north and south allow the instrument to point to the northern horizon and to the object-glass of the photoheliograph, which serves as a collimating lens. The roof of the photoheliograph house obstructs the view to the south at a zenith distance of 85°.

Besides the transit instrument, the building contains the sidereal clock Hohwa No. 35, mounted on a sandstone pier directly west of the transit, the Fauth chronograph No. 3, and tables or desks, provided with drawers and hook shelves for the convenience of the observer. The entrance to the transit house from the outside is directly in front of and only 18 feet distant from the door opening into the north hall of the main building. This entrance is protected by a small vestibule.

#### Photographic Laboratory.

This is in a small wooden house with brick foundation, 16 feet in an east and west and 12 feet in north and south dimensions, situated 60 feet south of the transit house.

The tube of the photoheliograph telescope enters the building 2½ feet to the east of the center. A door in the north side opens into a vestibule, and this into a hallway 3 feet wide,

no which the workmen's cottages are situated to the principal entrance, and a large archway in the center of the eastern side of the building communicates with a wide hall extending completely through to the western side and dividing the lower story into two similar parts. The second and third stories are also divided by partitions directly over the lower hall, so that the building contains two distinct and precisely similar dwellings, which, however, may be made to communicate when desirable, by doors in the partitions. The floors of the third story and the summit plateau are on the same level, and are connected by a bridge, which gives easy access to the observatory. Two roads, one on the north and the other on the south, lead up to the observatory from the second floor, on the west side of the house.

In each dwelling there are 16 rooms, two of which are bathrooms. They are substantially finished with hard white walls and polished woods.

#### Shops, Barne and Quarters for Workmen.

The quarters for workmen are situated on the saddle of the mountain connecting the observatory and other peaks, where a level place was cleared for the purpose. At the foot of the flight of steps leading up to the astronomer's residence is a large double cottage containing 11 rooms, formerly occupied by the superin-

uated on the northern slope of Mt. Copernicus, about three-fourths of a mile from the observatory. Five large wooden tanks, each holding 2000 gallons, collect the water, which is then forced by a steam pump through a 2-inch pipe three-fourths mile long into the reservoir on Mt. Kepler, 338 feet above the spring. Steam is supplied to the pump from a 20 horse power boiler, for the transportation of which a road had to be cut from the observatory in the side of the mountain. The reservoir on Kepler is built of brick and cement, and has a capacity of 35,000 gallons. Pipes lead from it to supply the buildings of the workmen, the astronomers dwelling and the observatory. The head of water at the level of the plateau is 48 feet. A 1½ inch pipe also leads to a reservoir on Huyghens' peak, an elevation near the workmen's quarters. This reservoir is built in the same manner as the first, and has a capacity of 65,000 gallons. It is below the level of the buildings on the summit, and in winter and spring is kept full of rain-water collected by their slate roofs. For this purpose a 2-inch pipe was laid deep in the ground before blasting was begun on the mountain. As the carrying capacity of this pipe is not sufficient during very heavy rains, a reservoir 10x6x4 feet, in which the surplus water can accumulate, is provided under the main building. In the summer or dry season the reservoir

ing about 27,000 gallons was built at the springs, so that the permanent storage capacity at Mt. Hamilton is 200,000 gallons.

#### The Great Lick Telescope.

[Written for the Press by E. E. BARNARD]

Majestic on its grand old mountain stands the great refractor of the Lick Observatory—an enduring and noble monument for all time to the man whose patient industry accumulated the means for its erection and whose honest peaceably beneath its mighty and vigilant eye.

This magnificent instrument, complete at last in all its details, not only stands a monument to the man whose money called it into being, but it will remain a still greater monument to the genius of the men whose brains and energy called forth from the sand and the mines the subtle materials and formed them into this noble telescope.

It is quite needless to explain how even the rough casting of the glass from which its lenses are made met with a score of failures, each failure meaning months of delay. Nor how these glasses finally made the hazardous journey across the ocean; nor how the great optician who fashioned their meaningless forms into the wonderful lens, lived but to see his work just



finished, crowning thus grandly the end of a remarkable life. Nor need we mention the endless difficulties that were overcome in the mechanical construction of its mounting, so that when the great glass was finished it could be used successfully; nor the danger it ran in being transported across the continent and finally carried up a steep mountain over 4000 feet high. These are subjects that have been well gone over by others, and a mere description of the telescope and its purposes is all that is needed here.

The Lick is the largest refractor ever constructed, and is the most powerful telescope in existence. It is not the largest; the great reflector of Lord Rosse at Parsonstown in Ire-

land is the greatest telescope yet constructed, but in that style of instrument the rays of light, instead of being transmitted through a refracting medium, are reflected from a concave or rather a parabolic surface made of metal and which absorbs a great percentage of the light. They are much inferior to the refractory form of telescope and have now gone out of use almost entirely. [This last remark does not include the silver on glass reflecting telescopes, some of which are doing valuable work and are not much inferior to refractors for certain purposes.]

middle where it is 4 feet in diameter to the ends which are 38 inches in diameter. The weight of this tube with all of its attachments is 8600 pounds.

The center of motion of the tube about the head of the pier is 37 feet above the base, and when observing in the zenith the object glass is 65 feet above the same point.

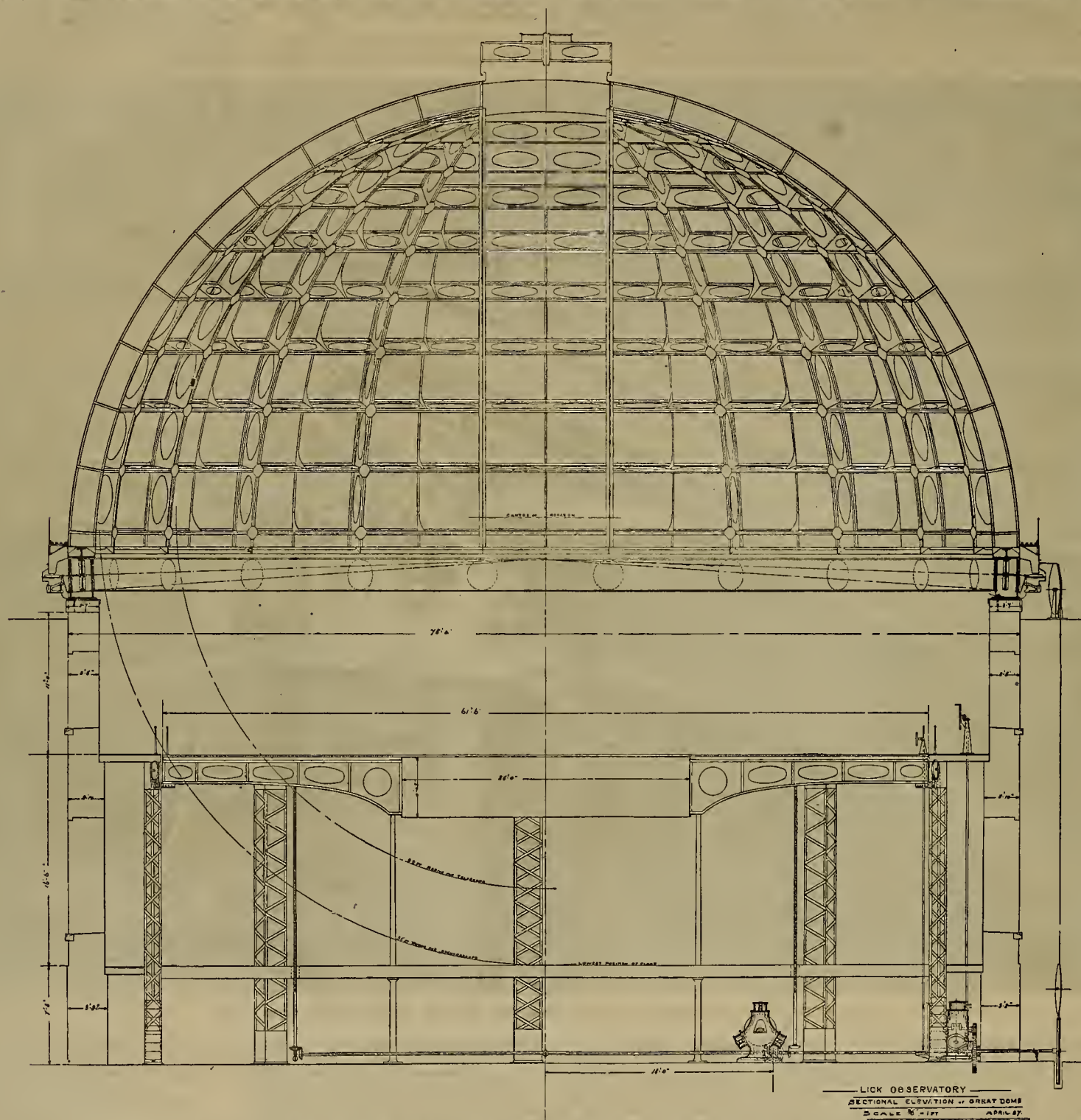
The object-glass forms a small image of an object at its principal focus—at the eye end of tube—this image by the aid of small microscopes, or eye-pieces, as they are called, can be magnified at will, only limited by the brightness of the object and the steadiness and purity of the atmosphere. The eye-pieces of this great instrument magnify from 180 to 4000 diameters,

east in one sidereal day, the telescope is made to move in the contrary direction and at the same rate, so that when once pointed on a star it will follow it ceaselessly for any length of time, from rising toward setting. This great telescope, besides being the most powerful in existence, consists of really three distinct instruments. The visual telescope for observing and measuring the celestial bodies, a gigantic spectroscope for analyzing their light, and an immense photographic camera for accurately picturing and recording forever their physical appearance. In a few minutes the telescope is converted into a photographic one, by placing in front of the visual objective a correcting lens 33 inches in diameter, which shortens the focus

Though an assistant is required upon the gallery, near the center of motion, when the telescope is to be moved to distant points of the sky, an observer at the eye-end can control all the motions of the instrument when observing any special object without leaving his seat and without assistance.

#### Micrometers.

A beautiful filar-micrometer has been made for the large equatorial by Fanth & Co. of Washington. The design for this micrometer, after having been drawn by the makers, was revised by Mr. Burnham. The completed instrument is very convenient in every respect.



SECTIONAL ELEVATION OF 75-FOOT DOME.—(The Elevating Floor is Shown at Its Highest Position.)

but the actual working power will be much less than the mean of these two numbers.

Three finders (small telescopes that take in a considerable portion of the sky, which are used for bringing an object into the field of the great telescope), one of which is shown in the cut, are placed on the side of the telescope near the eye end. The largest of these has an object glass six inches in diameter—an instrument that a few years ago was considered a large and certainly a powerful one; and arrangement is also made for attaching the object glass of the 12-inch equatorial to the big telescope for a finder in photographic work, should it be required as a pointing telescope. In the upper part of the pier an opening shows the clock-room in which is the double conical pendulum driving clock, which gives the telescope a slow but uniform motion about the polar axis (which is set perfectly parallel to the axis of the earth) at the rate of one complete revolution in 24 hours of sidereal time. As the earth rotates once upon its axis from west to

some 10 feet and brings the rays from that part of the spectrum beyond the violet, which are strong in actinic power, to a sharp focus forming an image, which, though invisible to the eye, is rich in photographic power.

With this it is intended to photograph the moon, the planets, the nebulae, comets and stars. Measurements of the photographs of the stars will give in many cases the means of determining their distances. As the photographic plate is more sensitive than the human eye, it is expected that many discoveries will be made by thus photographing the heavens that the eye alone could never reach.

With the visual objective and the large spectroscope (which was made by Brashear from designs by Mr. J. E. Keeler) the light from the celestial bodies can be analyzed and their chemical composition made known. With this instrument the motions of the celestial bodies will be studied and their velocities toward or from us will be determined by the displacement of certain lines in their spectra,

The makers say that after many trials they made a screw which is perfectly satisfactory to them. After it has been investigated at the observatory, it may be of interest to our readers to describe it further.

It is used to measure the distance apart of two stars *A* and *B* by placing a fixed spider-line over *A* and moving another spider-line by the screw until this last line bisects the star *B*.

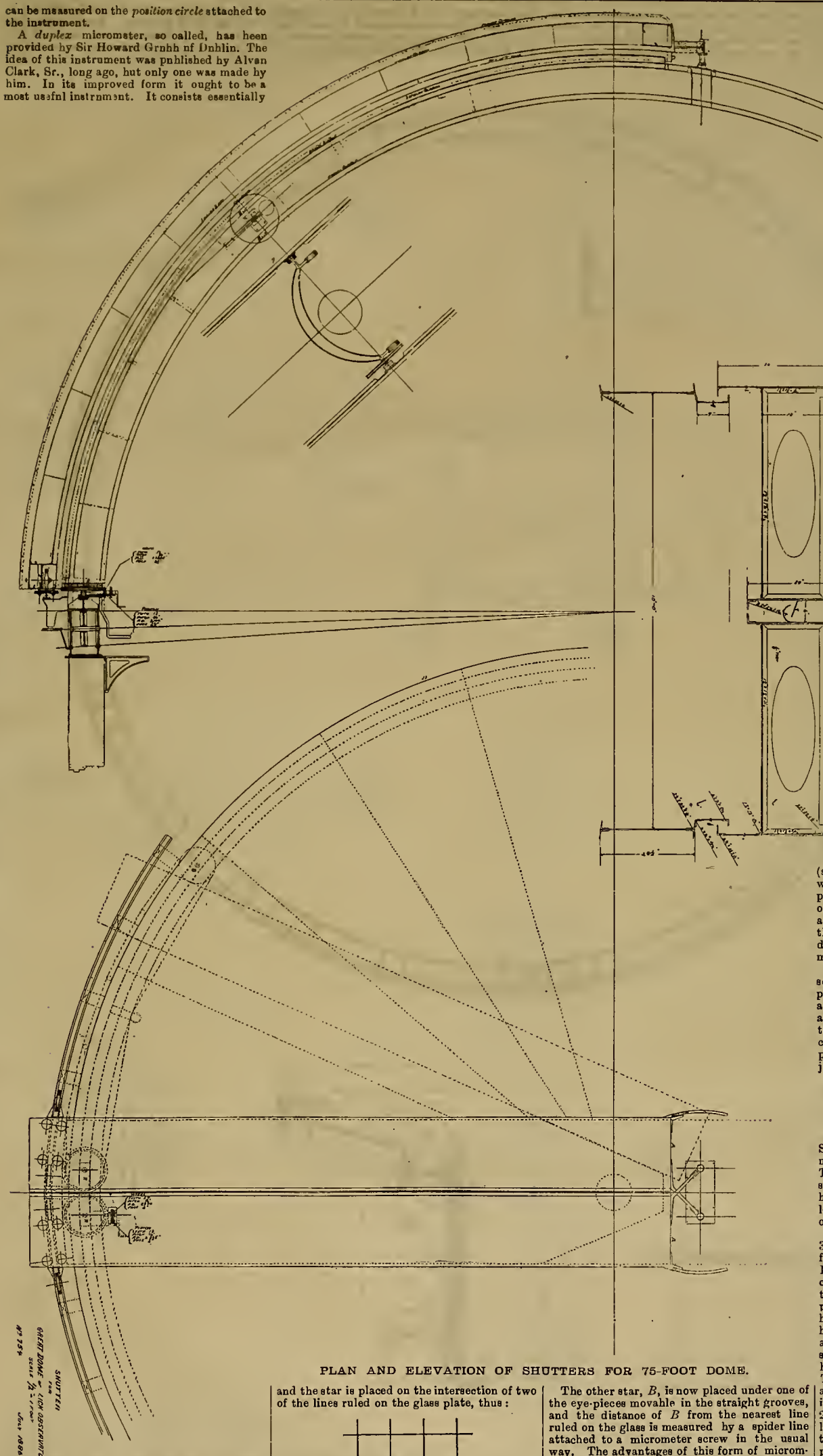


The distance apart of double stars, of satellites from their planets, etc., may be so measured. The angles of the lines *A-B* with the meridian



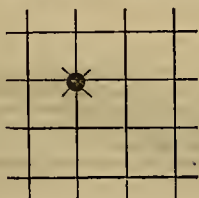
can be measured on the position circle attached to the instrument.

A duplex micrometer, so called, has been provided by Sir Howard Grubb of Dublin. The idea of this instrument was published by Alvan Clark, Sr., long ago, but only one was made by him. In its improved form it ought to be a most useful instrument. It consists essentially



PLAN AND ELEVATION OF SHUTTERS FOR 75-FOOT DOME.

and the star is placed on the intersection of two of the lines ruled on the glass plate, thus:



The other star, *B*, is now placed under one of the eye-pieces movable in the straight grooves, and the distance of *B* from the nearest line ruled on the glass is measured by a spider line attached to a micrometer screw in the usual way. The advantages of this form of micrometer are two. In the first place, long distances can be measured, since the eye-pieces over *A* and *B* may be much further apart than the field of a single eye-piece; and, second, the screw of the micrometer is used only to measure small arcs. The largest part of the distance of *A* and *B* is determined by counting the number of squares of the reticle included between them.

### The Spectroscope.

The spectroscope was constructed by Mr. J. A. Brashear of Allegheny, from plans furnished by Mr. Keeler, and is of very admirable workmanship. In form it resembles the simple spectroscope more closely than is usual with instruments of its kind. The frame carrying the collimator and pivots for the observing telescope is carried by two brass rods, six feet long and three inches in diameter, which project from the revolving jacket on the eye end of the great equatorial. This jacket is provided with position circles, clamp and slow motion screws, and the spectroscope rods can be rotated freely around the axis of the great telescope.

The collimating and observing telescopes are each  $20\frac{1}{2}$  inches focal length, and of 2.2 inches aperture. The range of the collimator slide is four inches, and the slide is provided with a millimeter scale which shows the position of the slit with respect to the focus of the great object glass. The slit has a great variety of attachments, among which are a separate rack and pinion motion and clamp, a double-motion screw for adjustment of width, with micrometer head, a double slide with pinion for adjustment of length, a slide which can be worked from the eye end for the reflecting prism of the comparison attachment, and a diagonal eye-piece for viewing the slit from behind, and thus setting it with great exactness upon a star. There are also a number of cylindrical lenses in suitable mountings.

The observing telescope is provided with a 12-inch circle, divided on silver to 10 minutes and reading by two verniers to 10 seconds, filar micrometer with a variety of eye-pieces, electric illumination for circle and micrometer, with apparatus for varying the color of the illumination, rack and pinion, clamp and graduation scale for the eye-pieces.

A "reversion attachment" containing a half-prism, reversion prism, and delicate micrometer, can be inserted in front of the object glass of the observing telescope, for measuring the motions of stars in the line of sight.

There are various prisms of different powers by Steinheil (some of them refugured by Mr. Brashear) which can be readily interchanged. The prism table can be turned readily by hand or by a tangent screw, or clamped to a contrivance which keeps the prism automatically in the position for minimum deviation. A fine diffraction grating by Rowland can also be mounted upon this table.

In addition to the apparatus already described, the instrument is provided with a comparison apparatus for spectra of gases and metals, spectrum tubes, induction coils and other accessories. It is mounted, when not in use on the telescope, in a case which rolls on rubber casters, and can then be used for laboratory experiments without at all interfering with its adjustments for astronomical work.

### The Mounting for the 36-Inch Telescope.

This mounting was made by Warner & Swasey of Cleveland, who had previously made many mountings for instruments of smaller size. They had diligently studied the problem for several years before undertaking this work, and by consultation with practical observers had learned just what conveniences were requisite or desirable.

The mounting proper rests on an iron column 37 feet high, made in sections of suitable size for transportation. The base of the column is 10x17 feet, and the top is 8x4 feet. The whole column weighs 36,000 pounds. Above this is the head, which weighs 8000 pounds and supports the polar axis. Around this head is a balcony on which an assistant astronomer can be stationed. By a system of wheels, the assistant can adjust the instrument on any star desired, and can read the position of the telescope by microscopes, illuminated by electric light. The polar axis is of steel 12 inches in diameter and weighs 2500 pounds. The declination axis is of steel 10 inches in diameter and weighs 2300 pounds. The tube is also of steel, 56 feet long. It is 4 feet in diameter at the center and tapers to 38 inches at each end. The tube complete weighs 8600 pounds. The entire weight of the mounting is 65,000 pounds.

The eye end of the telescope is made from designs by Prof. Langley and Prof. Holden, and is fitted for use with micrometers, spectroscopes, photometers, photographic apparatus, etc. This is the first mounting in which the wants of an observer with a spectroscope, a micrometer or a photographic apparatus are

in a glass plate ruled off into squares and viewed by several eye-pieces. To measure the distance apart of two stars, *A* and *B*, the telescope is moved until the star *A* is under the central eye-piece. The telescope is kept always directed on this star by means of the driving clock,



fully provided for in a convenient manner. The mounting has been inspected by competent authorities and pronounced to be entirely satisfactory. Reports to the contrary seem to have

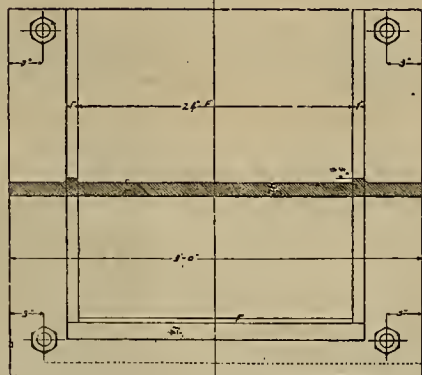
rest. As it was not certain what the size of the large objective would be, nothing of importance was done in regard to this structure until 1885. At this time it became tolerably certain that

the University of Wisconsin), and together these gentlemen made a complete project of the cylindrical drum and a complete computation of the strains on one of the main arches of a 75-

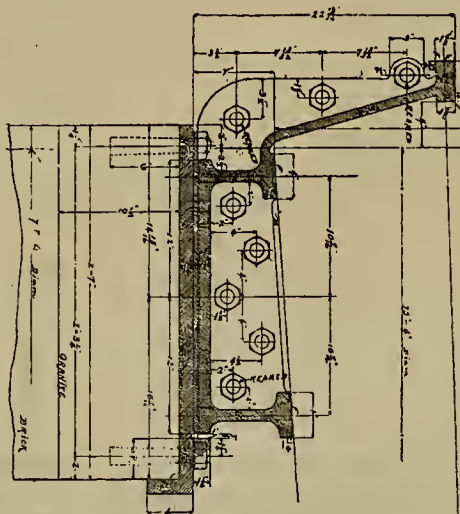
at the disposition of the Union Iron Works, by whom the dome was built. The cylindrical drum proposed by Professor Holden consisted of a series of brick arches buttressed so as to give

DETAILS OF TRACK, GUIDE AND EXPANSION BED-PLATES OF 75-FOOT DOME.

LICK OBSERVATORY  
DETAIL OF TRACK AND GUIDE  
SCALE 1/4" = 1' 0"



SCALE 3/4" = 1' 0"



PLAN SHOWING FACING STOPS  
SCALE 1/4" = 1' 0"



been inspired by envy and spread by ignorance.

The 75-Foot Dome.

The first sketch of a large dome was prepared by Profs. Newcomb and Holden in 1874. It provided for a cylindrical drum of brick arches on which the iron hemispherical cupola was to

the observatory would ultimately possess a 36-inch objective of about 60 feet focus, and that a dome of some 70 feet interior diameter would be required. Prof. Holden, then director of the Washburn Observatory, obtained the permission of the Lick Trustees to employ a very competent mechanical engineer (Prof. Ball of

foot dome. This computation was necessary to determine such dimensions of the main arches as would resist the enormous wind pressures due to the high winds at Mount Hamilton (70 to 80 miles per hour).

The plans and reports were submitted to the Lick Trustees in 1885, and were finally placed

the requisite strength. A few of the openings were used as windows. The rest were filled up by corrugated iron shutters on the inside and iron louvre-work on the outside. In this way the complete ventilation of the dome was insured. This is a most important and essential point. It is not too much to say that no



one of the large telescopes now mounted, excepting only the 26-inch of the Naval Observatory, is in a position to do its best work on account of the inefficient ventilation of its dome. The air inside and outside must be of precisely the same temperature, in order that

according to careful and elaborate drawings prepared by Mr. Dickie. This cupola was temporarily erected at the Union Iron Works in March, 1887, and completely finished at Mount Hamilton in October. The following account of the dome we owe to the kindness of Mr. H.

### Description of the 75-Foot Dome at Mt. Hamilton.

[Written for the Press by HUGO P. FREAR.]

The iron cupola is 75 feet 4 inches in outside diameter and 71 feet diameter on the inside. The inner circle of the dome is thus 224.05 feet. The dome rests on a circular brick wall which is finished with the diameter of the dome on the outside and stands 35 feet 2 inches above the exterior ground. The wall is 3 feet 2 inches thick at the base, being reduced on the inside to 2 feet 5 inches at the top.

The total height of the dome from the base to the zenith is 76 feet 10 inches. The brick wall is capped by a coping of 44 sandstone blocks 10 inches thick and 3 feet square. To each of these blocks a cast-iron sole plate is rigidly bolted. Each of these plates is 3 feet x 3 feet x 1 1/4 inches and has a facing on top 24 inches square, upon which the track of the dome rests. The faced surfaces are therefore 5.09 feet apart on the inner circle of the dome. This allows for expansion and contraction which, with the extremes of temperature on Mt. Hamilton, is about one-half inch in diameter, and three times as much in

means are provided for forcing oil between the two bearing surfaces of the sole plate and the base of the track. This is accomplished by a screw 6 inches long and three-fourths inch in diameter, which screws the oil into a central reservoir, from which a groove is led to each of the four corners of the surfaces. As power is applied to the screw, the oil is spread over the surfaces from all directions. A shoulder is cast on each sole plate on the inner edge to prevent the track from working away from its central position.

This is especially necessary as the dome expands and contracts more on the sunny side, and as this expansion has a positive tendency to move the dome bodily from its normal position.

The lower track upon which the live-ring rollers of the dome revolve is of cast iron and made in 22 segments, each a little more than 10 feet in length. The best idea can be obtained by referring to the cut (No. 22). There are two rails on this track which are a part of a conical surface, the apex of which lies in the vertical axis of the dome and in a plane with the top of the rollers. One of the main features of this track, which is peculiar to this design, is a well-ribbed flange carried up on the outside to a line passing through the center of the rollers and the apex of the cone of the track. At the upper edge of this flange two smaller flanges are carried all around, one inside and the other on the outside. These serve a double purpose. The inside flange resists any tendency of the rollers which form the live ring to slide outward or down the cone.

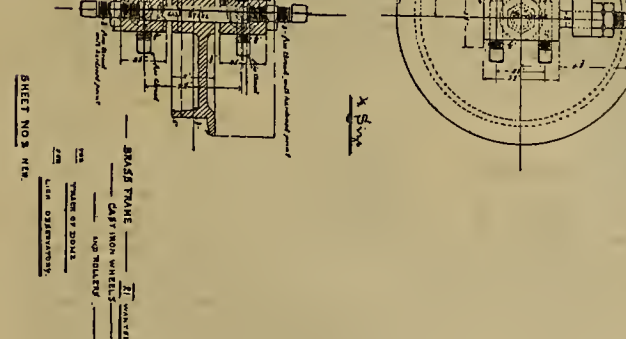
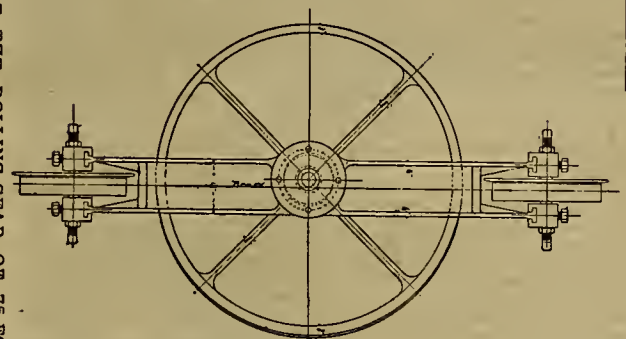
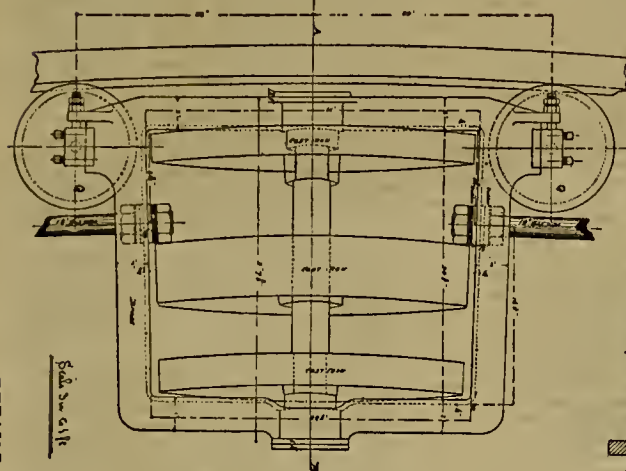
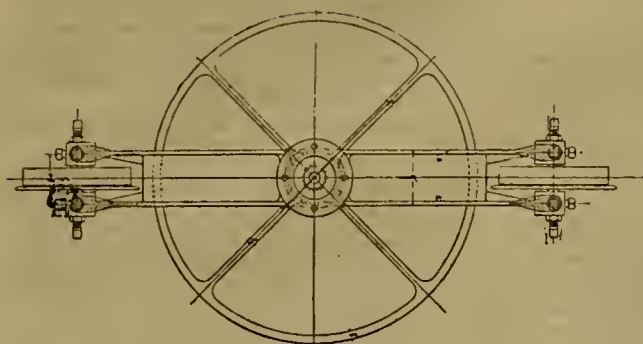
Such a thrust is received in a line with the center of the rollers. The outside flange guides the dome during its revolution by means of 22 horizontal rollers carried on brackets which extend down from the base of the cupola. Each of these rollers has a flange on its lower edge which slips under the guide flange and thus resists all lifting tendency. Every effort was made to have the conical track as accurate as possible. Upon the accuracy of this and of the live ring, the excellence of the dome depends in a great measure. It is a difficult problem to face up a cone 75 feet in diameter. To accomplish this an attachment was put on the 25-foot boring-mill or upright lathe of the Union Iron Works. This attachment consisted of a pedestal firmly bolted to a concrete bed and of a massive radius bar of cast iron 42 feet long, pivoted at one end on the pedestal and carried at the other end in a horizontal plane by the cross motion of the boring-mill. After the segments of the conical track were planed up on the ends to the correct angle, two of them were bolted together and placed on the table of the boring-mill concentric with the pivot pedestal at the correct radius. As the radius bar was carried back and forth a tool working on an incline set to the angle of the cone was fed along the track, thus forming a perfect conical surface.

The live ring consists of 21 conical rollers. Each roller consists of three wheels. The base plate of the cupola rolls on the center wheel of the three, and the other two rollers travel on the lower track described above.

The outside wheel is about 30 inches in diameter, and the inside wheel about 23 1/2 inches in diameter. The three wheels are of cast iron pressed on to a steel spindle 3 1/2 inches in diameter. The webs are cast so that those of the inner and outer wheels stand vertical to the lower track and so that the webs of the central wheel stand vertical to the upper track. Thus the strain is taken directly and there is no tendency for the wheels to warp. Thus they have been made much lighter than otherwise would have been necessary. Each set of rollers is surrounded by a light brass frame hung by means of anti-friction roller journals at the extremities of the spindles. Each journal has 13 hardened steel rollers three-fourths inch in diameter fitted very nicely, and thus nearly all sliding friction is avoided. At the ends of the brass frames opposite the main guide track horizontal rollers are carried on steel center points which are capable of adjustment in both vertical and horizontal planes. These rollers travel on the guide-track and resist any tendency to throw the conical rollers of the live ring out of their true position and serve to keep the axes always pointing toward the center of the dome. The rollers have a flange on the upper edge which slips over the top of the guide-track and prevents any rocking motion of the frames. The different frames are connected together, making the live ring continuous by 1 1/4 inches gas pipe screwed up against rubber washers whose elasticity allows slight expansion and contraction.

Though not absolutely necessary, it was desirable to have the top of the conical rollers in a horizontal plane, so that if the dome drifted slightly from its position it would not affect its working. Extreme care was taken in turning up the conical rollers themselves. The diameters were first calculated and the rollers roughed off to the size. Then a segment of the conical track was leveled up with respect to the surface, which rests on the sole plates, and a roller was placed on it in the correct position. With a micrometer the distance between the top of the roller and the bottom surface of the casing was then accurately calipered. The taper of the cone, of which the roller formed a part, was changed until the upper part of the rim was in a horizontal plane. After the lathe was properly set to turn up the correct taper, a very light cut was taken off all the rollers with the same tool, making them exactly alike.

The upper track or base-plate of the cupola, which travels on the center wheel of the conical rollers, is of cast iron, and also in 22 segments,



the telescope may do its best work. Even at Washington the performance of the object glass becomes better and better until after midnight—that is, until the whole objective and the inside and outside air have attained the same temperature. The plan submitted was not accepted by the trustees, who decided on a solid cylinder of brick with only a few small openings for windows. This drum was built in 42 working days under the energetic supervision of Mr. Fraser in the summer of 1886. The iron cupola was built by the Union Iron Works, ac-

P. Frear, Chief Draughtsman of the U. I. W., who made all of the drawings of the cupola, and most of those for the elevating floor. We have to thank Mr. Irving Scott and Mr. Dickie of the U. I. W. for permission to print this and to reproduce the accompanying cuts.

circumference of the dome. This feature removes the greater part of a strain from the walls, which otherwise might produce injury to them. The walls have, however, to resist the friction produced by the sliding of the superstructure on the sole plate due to expansion and contraction. To reduce this to a minimum



The surface of the track lies in a horizontal plane which makes a great circle of the cupola above. The segments were carefully planed up radially on the ends and bolted together with reamed bolts. The track was planed to a true surface. Each segment was cast with a vertically ribbed flange in the center on the outside, to carry the brackets which hold the guide rollers of the dome which are described above. These brackets were so constructed that the rollers could be adjusted to suit the guide track. A narrow flange was carried all the way around on the outside to connect the base plate with the skin of the dome. A similar flange was also carried all around on the inside for stiffness. At each of the joints a vertical flange was carried on one segment above the main casting to connect with the main frames of the dome.

The framing of the dome consists of two continuous main arches or slit girders parallel to each other and 10 feet between centers, symmetrical with the vertical axis of the dome, which are solid plate girders 26 inches deep with webs  $\frac{1}{2}$  inch thick, and double angles on the inner and outer edges  $2\frac{1}{2}$  inches  $\times$   $2\frac{1}{2}$  inches  $\times$   $\frac{1}{2}$  inch. The girders not being in a great circle of the dome necessitated beveling the angles, so that they would lie fair with the skin. These are rigidly riveted to the cast-iron base plate at the bottom and might well be termed the backbone of the dome. Nine radial frames or girders are equally spaced on each side of the slit, stepping on the base plate at the bottom, and putting on the slit girders at the top. These are also plate girders 26 inches deep and have double angles on the two edges  $1\frac{1}{2}$  inches  $\times$   $1\frac{1}{2}$  inches  $\times$  3-16 inch.

The webs are 3 16 inch steel plate lightened with large oval holes about 4 feet long and 19 inches wide. Ten intercostal girders are carried all around horizontally, spaced about 5 feet apart, the first one being 26 inches above the top of the conical rollers.

These are of the same depth as the main frames with single angles on the outside to connect with the skin, and double angles on the inside. The webs are lighted by oval holes. At the intersection with the main frames on the inside, gussets 12 inches square were riveted on for strength and also to add to the appearance of the interior. The intercostals not only hold the main frames in position and brace them against wind pressure, but also by their hoop tension greatly strengthen them to resist a vertical load.

This structure not only must sustain its own weight, but it must resist the great strains due to the high winds on Mt. Hamilton, which at times blow at the rate of 70 to 80 miles an hour. It was also designed so that it could be used for slipping the tube and mounting of the telescope, and raising any ordinary weights by blocks attached to the inner side of the main girders.

The dome is covered with galvanized steel plates carried around in horizontal strakes about 26 inches in width. The lower or shear strake is three-sixteenths inch plate well riveted to the outer flange of the base plate. The huts were carefully shifted with the joints of the castings.

The dome was laid down full size in the molding loft of the Union Iron Works. The slit girders were built to the line and riveted in segment as large as could be shipped conveniently. The stations where the radial girders butted at the top were lined and the holes punched. All the radial girders were projected in their true shape, built to the line and the holes at the ends punched to match the rest of the work. Each intercostal was expanded to its true shape on the floor, and the angles set and riveted on. These intercostals being normal to the skin, formed frustra of cones, and after being riveted were set to their proper shape.

Every segment of plating was expanded on the floor, cut to the size and the holes punched on two sides. They were then hammered to a spherical shape. In this way the whole of the framing of the dome was completed ready for erection, each piece ready to fit into its own place. The framing was erected at the Union Iron Works. Everything came together so nicely that it was considered unnecessary to try the plating, which was immediately shipped to Mt. Hamilton. A temporary Bishop derrick was erected in the center of the dome and used for lifting all weights, both at the Union Iron Works and at Mt. Hamilton.

It was considered important to make the dome rain and snow tight. To accomplish this an umbrella of No. 18 B. W. G. gal. steel plate was attached to the guide brackets before mentioned and carried down all the way round. The lower edge of this umbrella dipped into a cast-iron trough which can be filled with glycerine and water, or any non-freezing liquid. This sealing trough was connected to the brick wall, thus making the dome absolutely rain-tight at the bottom.

The slit is 9 feet 6 $\frac{3}{4}$  inches wide in the clear, and extends from the first intercostal at the bottom to 3 feet 6 inches beyond the zenith, giving ample space for observing from the horizon to the zenith. The shutters are constructed on the general plan described by Professor Holden in the *American Journal of Science*, November, 1873, with important improvements in the position of the pivots devised at the Union Iron Works, and with Mr. Fraser's rain-tight joint.

The slit is closed by two shutters which open like a pair of scissors and are pivoted 6 feet beyond the zenith and 20 inches each to the

opposite side of the vertical plane, symmetrically dividing the slit. This eccentric pivoting keeps the shutters closer to the dome and avoids expense and also exposure to violent winds. The track on which the lower end of the shutters travel is supported by the guide brackets and is made to radii struck from vertical lines passing through the pivots. These radii are considerably greater than the radius of the dome, being 45 feet 3 inches. The center of each portion of the shutter track was shifted to the opposite side of the center, as was said. Theoretically, these centers would lie in vertical planes perpendicular to tangents to the dome at points equally distant between the center and ends of the track. Practically, it was not easy to place the centers quite in these positions, as it required very long arms which crossed each other and consequently could not be made sufficiently deep for the strength required to support the load. The rollers at the bottom were turned up to a true cone and were fitted with anti-friction roller bearings. At the extreme bottom of the shutters, two pairs of horizontal guide rollers keep them on the track. The rollers have flanges which lip under the track to prevent the wind from lifting the shutters. The shutters are supported at the outer corners at the top by conical rollers that travel small tracks, whose centers are the pivots. The track girders are built up of steel plates and angles similar to the slit girders. They are placed both on the inside and outside with No. 18 B. W. G. gal. steel plate.

An air space of 18 inches is allowed between the two skins to prevent condensation of water and consequent dripping on the telescope. That part between the slit girders not occupied by the shutters is also plated on the inside for the same reason.

The telescope when in use is always in the plane of the slit girder. The shutters are operated by hand by means of a wire rope winding off two right and left hand drums coupled together and geared down by a train of wheels.

A combing six inches high is carried all around the slit. A rubber gasket is bolted to the edge of the shutter, which closes up against this combing to form a water-tight connection. The shutters also come together against a rubber gasket. Rain troughs are placed on the inside as a safeguard.

An iron ladder is carried up on the outside of each shutter. Similar ladders are also carried up at three other points of the dome 90° apart. These make the outside work easily accessible for inspection and painting. At the base of the dome a narrow gallery runs all around outside excepting at that portion occupied by the shutter tracks, and it is supported by the guide brackets. From this gallery the guide rollers can be inspected and platforms can be suspended, from which all the ironwork below can be painted.

A gutter is carried around at the base of the dome to collect the rain-water, which in the dry season has to be used very economically.

The power for turning the dome is transmitted by a water engine through an endless wire rope which passes around the base of the dome and over two sheaves, thence down around the driving sheave and thence up again around a tightening sheave which can be raised or lowered by means of a screw and hand wheel. The rope is five-eighths inch diameter well served with manila. The driving sheave, which is five feet in diameter, has two grooves with rubber seats. The rope takes a full turn and a half around this sheave, thus allowing sufficient friction for turning the dome without requiring an excessive friction on the rope, which would increase the tension in the journals and require more power. Then there is sufficient tension on the rope to take the weight of the driving sheave, there is ample grip for driving the dome. The tightening sheave is twisted sufficiently out of the plane of the driving sheave to allow the rope a fair lead from the two grooves.

The water engine is a three-cylinder single-acting trunk-water engine, designed to work under the head obtained at Mt. Hamilton, which is about 65 pounds to the square inch with the present hydraulic arrangements. The cylinders are 8 inches diameter by 6 inches stroke, and have each a single port and piston valves without lap or lead. All the working parts of the engine are inclosed in a neatly-shaped cast-iron box-frame, and made accessible by hand-holes. This is done to save the water, due to leakage, if there should be any, which now passes off through the drain pipe at the bottom. The engines are reversed by changing the feed to the discharge and vice versa. This is accomplished by two pipes leading from either side of the piston valves to an auxiliary *D* slide valve, which, as it is moved in either direction, distributes the water to or exhausts from either pipe. A differential hand gear, which is operated from the elevating floor, is attached to this valve. The valve spindle (which is vertical) is hinged to the center of a short lever, which is horizontal in its normal position. One end of this lever is screwed up or down by a hand-screw extending to the top of the elevating floor. The other end is screwed up or down by a screw geared directly to the main shaft of the engine. So long as the hand-screw is turned, the valve will be pushed open in one direction or the other. As the engine runs the other screw will be following up in the opposite direction with a tendency to close the valve.

When the hand-screw is stopped the engine runs until the valve gets on its center and then comes to rest. The dome revolves in either direction, according as the hand-wheel is turned

one way or the other. As time is valuable while making observations, it is desirable to move the dome in the direction of the shortest path. For this reason the screws are made sufficiently long to allow the dome to make 12 complete revolutions in either direction.

	Pounds.
Total weight of shutters.....	16,000
" " cupola, including shutters.....	174,000
" " live ring.....	35,000
" " moving parts.....	199,000
" " metal to dome, not including floor.....	269,000
" " elevating floor.....	50,000
Cast iron and lead counterweights for floor.....	50,000
Iron-work for supporting floor and gallery.....	8,000
Total number of rivets and bolts.....	250,000

#### Elevating Floor (Sir Howard Grubb's Plan).

This floor or elevator is 61 feet 6 inches in diameter and has a travel of 16 feet 6 inches. It has a circular aperture 25 feet in diameter in the center surrounding the pedestal of the telescope. When at its lowest position it is on a level with the first gallery to which the main entrances of the dome lead. At its highest position it is flush with the second gallery. A stairway leads up from the first to the second gallery, from which the floor is accessible in all positions. The galleries and floor have movable band rails, which can be taken away when they interfere with the observing chair.

The floor consists of 20 radial girders built up of plate and angles similar to the main framing of the dome. At the outer end they are connected together by a continuous vertical plate 24 inches deep, and also by a horizontal continuous stringer plate 12 inches wide top and bottom. The inner ends are connected in the same way except that the vertical plate is 4 feet 4 $\frac{1}{2}$  inches deep. The radials are stiffened at the center by intercostals. The floor proper is laid with ash 2 inches by 2 inches in circular strakes. The floor is perfectly balanced by 8 cast-iron weights hung by a flat steel rope 2 $\frac{1}{2}$  inches wide and  $\frac{3}{8}$  inches thick, passing over sheaves carried by rectangular columns. These columns are built up of four-corner angles with lattice sides and the counter weights move up and down within them. A 2 $\frac{1}{2}$ -inch screw with 1-inch pitch containing 198 threads is carried up on four of these columns to the full height. It is by means of these screws that the floor is raised and lowered. Beneath the floor a line of shafting two inches diameter is carried around, connecting the four screws by miters, causing them to move together. This shafting is driven by a water engine of the same pattern as that used for turning the dome. It is operated by the same style of differential hand-gear from the top of the floor, so that both can be worked at the same time by one man.

#### Hydraulic Rams for Elevating the Floor.

The water engines previously described were found to be too slow in action (requiring 50 minutes or more to raise the floor 16 $\frac{1}{2}$  feet), and on this and other accounts it was decided by the president of the Lick Trustees to use them only as an auxiliary motive-power (available should the substitute for them break down temporarily) and to provide a new device which would be more rapid and which would use less water.

The new arrangement consists of four (4) telescopic hydraulic rams placed at equal distances around the outer rim of the floor. The rams are eight inches in diameter. They were made telescopic in form so as to reduce the depth of the holes in the rock beneath the dome which receive the cylinders.

To keep the floor level as it moves up and down, a 2 $\frac{1}{2}$  inch shaft is carried all around the floor, so arranged that four pinions keyed to this shaft engage in vertical racks fastened to four of the columns which support the gallery.

The rams are operated by the same differential valve which operates the engine. If the floor is down and the valve is opened, the floor commences to rise and at the same time automatically closes the valve. Similarly as the floor sinks it automatically closes the valve. This is designed to prevent any possible accident. An indicator is attached to the valve, which shows the observer how much the valve is opened, and it is so arranged that its indications can be read in the dark. In the preliminary trials these rams raised the floor 16 $\frac{1}{2}$  feet in less than 9 minutes and lowered it in less than 5 minutes.

#### The Astronomical Instruments.

The descriptions of the 36-inch and the 12-inch telescopes are given elsewhere. There is also a 6 $\frac{1}{2}$  inch equatorial telescope, the objective by Clark & Sons and the mounting by Warner & Swasey. In ordering the Repsold meridian circle it was stipulated that the three objectives of equal size, which belonged respectively to the circle and to the two collimators, should be made by Alvan Clark & Sons. The north collimator is to remain always in position. The south collimator will be used in connection with it for determination of the horizontal flexure by the method of opposite collimators, but can be replaced for determinations of collimation by the south *mirre* about 80 feet distant.

Its objective thus becomes available for other purposes, and Messrs. Warner and Swasey have provided a portable mounting for this objective, which is shown in the engraving. It is the work of a few moments to detach the col-

limator objective in its cell and to adapt it to the tube of the six-inch mounting. The east-iron column of this mounting is hollow and contains the driving clock and weights. It can be taken apart just below the clock for greater convenience in transportation, when the instrument is used on eclipse or other astronomical expeditions. The clamp and slow-motion screws in right ascension and declination are very conveniently arranged so as to be under the control of the observer at the eye end of the telescope. The polar axis is adjustable to any latitude down to 10 degrees.

#### The Micrometer of the 12-Inch Equatorial.

The illustration of the micrometer of the 12-inch equatorial is engraved from a photograph of the Lick Observatory micrometer, the construction of which will be understood from a brief description. The Council of the Royal Astronomical Society allowed the Lick Trustees to use the engraving in their "Publication." The cut shows Burnham's illuminating apparatus attached. Mr. Burnham's description is as follows:

"The micrometer is of the usual form made by the Clarks, *B* being the graduated head of the micrometer screw, and *A* another graduated head turning on the same axis for giving the whole revolution of the screws. *C* is the head of a pinion attached to the plate under the micrometer-box, and gearing into the teeth of the rigid circular plate containing the position circle, for moving the wires in position angle. *D* is the head of another small pinion for sliding the eye piece over the wires. *E E'* are heads of the bisecting-screw for moving the whole system of wires and the box *S* in a direction parallel to the micrometer-screw and at right angles to the wires.

"The light from the lamp *L* is reflected by a mirror in *N*, and passes down that tube and through *M*, and then through a hole in the end of the box to the wires. A condensing lens is placed in *N*, for the purpose of concentrating the light on the wires. On the opposite side of the wires, toward the micrometer head, a small reflector is placed, which reflects the light back, thereby symmetrically illuminating the wires on both sides. The lamp swings freely on its axis in the line of *OT*, but always maintains a vertical position, whatever may be the direction of the wires or the pointing of the telescope. The tube *N*, with the lamp and its attachments, has an axle *R*, supported by the fixed arm *K*. The bearings *T*, and the axle of the lamp, are kept always horizontal by the weight of the counterpoise *P*. The tube *M* is fixed to the micrometer-box and projects loosely over *N* far enough to allow for the necessary movement of the box by the bisecting-screw *B*. The supporting arm *K* is attached by the set-screw *J*, not to the box, but to the plate underneath it, so that the weight moved by the bisecting-screw is not increased at all by the illuminating apparatus. Attached to the same plate, on the opposite side by a set-screw *I*, is the rod *H*, bent so as to be thrown forward out of the way of *B* and *B'*, with a weight *F* to balance the weight of the lamp attachments. The whole device can be instantly detached when desired, by loosening the screws *I* and *J*.

"In the tube *M* is a slot *V*, in which is placed a slip of red or other colored glass, held in any desired place by a light spring pressing against it. All or any part of the light can be made to pass through the colored medium. The mirror in *N* is attached to a tube which slides into the tube *O*. By turning this tube by the milled edge projecting at *O*, the inclination of the mirror may be varied to any extent, and the light reduced from the maximum amount until the wires become just visible. By turning the mirror 90° or more, the light is entirely shut off. It will be seen that the lamp can revolve freely through the bent arm, *Q*, and the whole movable part of the device, lamp, arm *Q*, and counterpoise *P*, can turn through the supporting arm *K*, the lamp at all times remaining vertical and in exactly the same position with respect to the wires. It might at first be supposed that the lamp, or some of the parts, would be in the way of the observer. I have never found it so in practice, and, although it is but a few seconds' work to either attach or detach it, I have very rarely removed it, whatever might have been the use of the telescope at the time.

"It is important to preserve the relative positions of the micrometer head, bisecting screw and pinion *C*, as here shown. No other arrangement will be as convenient. In every possible position of the micrometer the necessary use of both hands at the same time will be found to be convenient and easy for the observer. Naturally the more delicate motions of the micrometer screw and the pinion will be effected by the right hand, and the corresponding movement of the bisecting screw by the left hand. When the micrometer-box is anywhere near a horizontal position with respect to the observer (the wires at right angles to the line joining the eyes), *C* and *E* are used by the right and left hand respectively in measuring angles, and *B* and *E* in measuring distances. When the box is more nearly vertical with respect to the observer, the head *B* of the bisecting screw will be worked by the left hand in each case. The convenience and practical value of this arrangement can only be appreciated by one who has used the old plans and then tried this one.

With respect to the practical working of the illumination, I will briefly say that it has proved a complete success in every respect,



Any object that can be seen under any circumstances, however faint, can be well and accurately measured. There is no such thing as a star too faint for measurement, if it can be seen at all. A very feeble light is sufficient to illuminate the wires perfectly for any object."

A complete set of eye-pieces of various powers has been obtained from Steinheil. These are furnished with adapters of various sizes, so that they can be used with any of the equatorials.

#### The Driving Clocks.

The driving clock for the 6½-inch telescope has several features of interest. The double conical pendulum is so hung that its period of revolution is very nearly independent of the height of the balls, which always assume the position proper to their velocity of rotation, although the retarding friction increases continuously as the balls diverge. The rate of the clock is controlled by simply turning the balls, whose center of gravity does not coincide with the geometric center about their axis, the position being indicated by a graduated arc on the face of the ball. The performance of this clock is very satisfactory. The same clock is used in the Warner & Swasey chronograph, with the addition of an effective control from a clock bending seconds. The design of the driving clock for the 36-inch equatorial is similar to this.

#### The Comet-Seeker and the Photoheliograph.

The four-inch comet-seeker (by Alvan Clark & Sons) has an aperture of four inches and a focal length of about 33 inches. The rays from the objective fall on a reflecting prism midway in the tube, and are bent into a horizontal plane. The observer has only to move his eye in azimuth while the telescope tube is moved in altitude, in order to cover the whole sky. The motion in altitude is effected by means of a crank. The instrument was ordered on the recommendation of Prof. Newcomb in 1880, and delivered in 1881. In the latter year it was used to observe the transit of Mercury.

The photoheliograph (by Clark & Sons) is mounted due south of the transit house; the transit instrument serves to determine the position of the axes of the photoheliograph; and conversely, the photoheliograph is used as a south collimator for the transit. The instrument is substantially of the same form as those employed in the United States transit of Venus expeditions of 1874 and 1882, which have been described (with plates) in the "American Observations of the Transit of Venus, 1874, Part I." The Lick photoheliograph has an objective five inches in diameter. Its focal length is al-

Messrs. Repsold, and thoroughly inspected by Professor Auwers and by Professor Krueger, who were kind enough to do this at the request of the Lick Trustees. A few very small changes were made at their suggestion. In a

meridian circle pattern were omitted. It was mounted in October, 1881, and has since served for time determinations.

In 1885 it was remodeled by the makers according to designs by Prof. Holden. The ob-

ment. Some minor details are omitted in the cut.

#### Declinograph.

In April, 1885, Dr. Johann Palisa, of the Observatory of Vienna, kindly undertook to have a declinograph made which would fit either the 12-inch or the 6-inch equatorial. This instrument was delivered in 1886.

It will not be necessary to give here any elaborate description of the apparatus. Its principle has been set forth in communications by Dr. Knorre of Berlin, and by Dr. Palisa in the *Astronomische Nachrichten*.

#### Universal Instrument by Repsold.

A universal instrument by Repsold was delivered in 1885. Its telescope tube is broken at the middle, where a reflecting prism sends the rays through the axis to the eye. Its aperture is 2.15 inches; the length of the axis between bearing surfaces of pivots to 11½ inches; the horizontal circle, 10 inches diameter, is divided to 4', and reads by two microscopes to 2". The vertical circle is 9½ inches in diameter, is divided to 4', and reads by two microscopes to 2".

This instrument, together with the six-inch equatorial and a chronometer, constitutes an outfit which can be packed in a few hours, and which is very suitable for astronomical expeditions. All these instruments pack readily into boxes of convenient size and shape.

#### The Clocks, Chronometers and Chronographs.

There are two clocks by Hohwn, each of essentially the same pattern. One is mounted in the transit-house on a sandstone monolith and the other is mounted in a closet in the clock-room.

The Dent clock is mounted on a closet in the meridian circle house. It has a double four-legged gravity escapement and mercurial compensated pendulum. The pivions have 18 leaves. The workmanship throughout is of very great excellence.

The Frodsham clock is intended for the dome of the 36-inch equatorial. It closes an electric circuit every odd second and also on the zero second of every minute. The pendulum carries a single large jar of mercury.

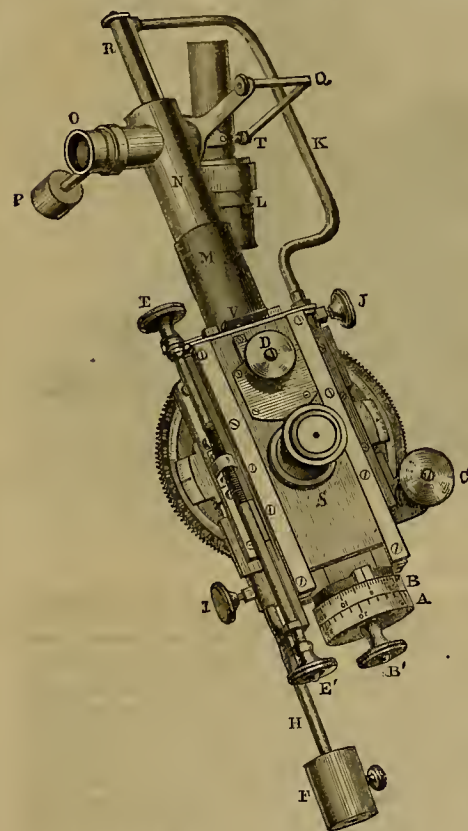
The Howard clock is regulated to mean-time. Its face shows "Pacific time," i. e., the local time of the meridian 120° west from Greenwich. ("Pacific time" is 6m 34s. 29 faster than Mt. Hamilton time). It is used as the standard mean time clock, and especially to send a time signal at 12 m. daily (except Sunday) to the larger cities, to railways in California, and to send signals every 2s during the day-time to various places in the city of San Jose.



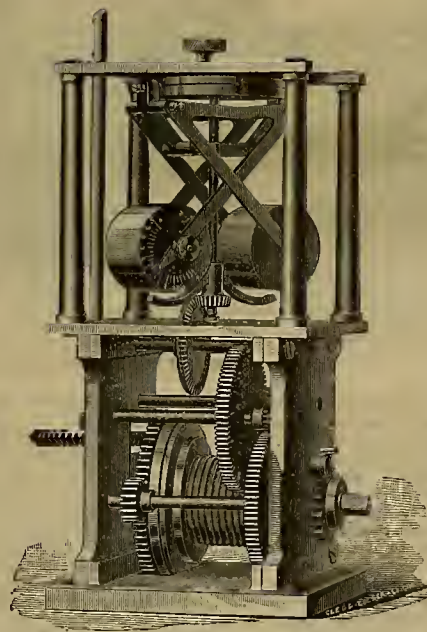
THE 6 1-2 INCH EQUATORIAL.

letter of May 6, 1884, Professors Auwers and Krueger say that "we assure the Trustees that the meridian circle ordered of the Messrs. Repsold is in its construction in every way suited

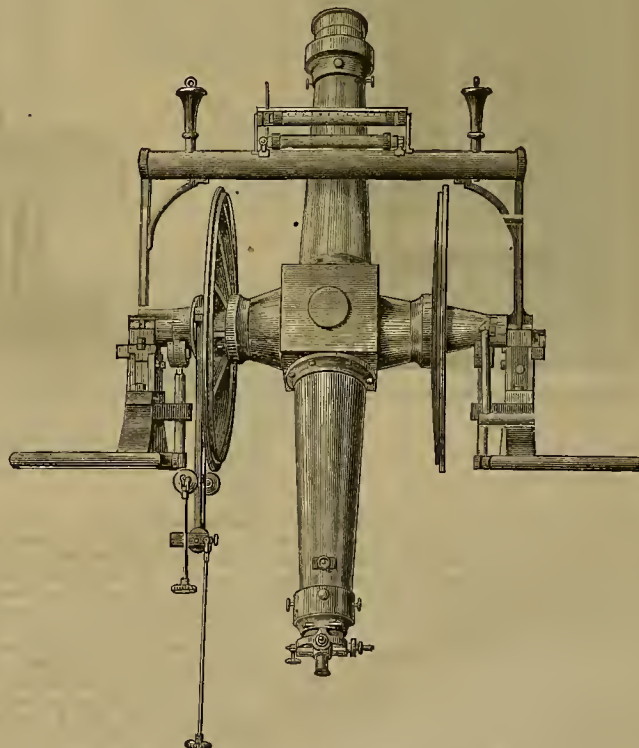
jective (which is a very excellent one by Alvan Clark & Sons) received a new cell. The eye end was remodeled so that the micrometer can be revolved 90° in position angle between metal



MICROMETER FOR 12-INCH EQUATORIAL.



DRIVING CLOCK.



THE FAUTH TRANSIT.

most exactly 40 feet. The diameter of the mirror is a little greater than seven inches, and unlike the instruments of the Transit of Venus Commission, the mechanism supporting the mirror is compactly connected with the clock-work which drives it, all being mounted on a single pier. Prof. David P. Todd used this instrument at Mt. Hamilton in his observations of the transit of Venus in 1882.

#### The Six-Inch Repsold Meridian Circle.

This instrument was ordered by the Lick Trustees in 1882 and delivered in 1884, when it was mounted by Mr. Fraser and Professor Holden. Previous to its dispatch to America it was temporarily mounted at the obse of the

to be the chief instrument in an observatory of the first class."

#### Four-Inch Transit and Zenith Telescope Combined.

This instrument by Fauth & Co. was ordered on the recommendation of Prof. Newcomb in 1880, and delivered in 1881. The aperture is 4.1 inches. It is essentially of the same pattern as the meridian circle of the School of Science at Princeton, New Jersey, by the same makers. As originally ordered, it had two circles 16 inches in diameter, one divided coarsely on the edge and read by verniers to 1', the other provided with an undivided hand of silver. The microscope hearers, etc., of the

stops. In this way it can be used either in R. A. or in Z. D. The undivided circle was divided so as to read by opposite verniers to 10', and a sensitive level in Z. D. was provided, with a clamp and tangent screw attached. In this way the instrument becomes a zenith telescope also, and can be used for an independent determination of the latitude by Talcott's method.

It is possible that instrument may find an application in determining stars of equal Z. D. north and south, and thus affording a check on any system of standard declinations. The east Y is movable in azimuth. The adjusting screw has 60 threads to the inch and each thread is about 100". The west Y is movable in level. The clamp in Z. D. reverses with the instru-

The escapement is Graham's. The pendulum is a steel rod which carries four steel jars in a cluster, each jar being filled with mercury. The seconds arbor has a steel scape-wheel of 30 teeth (one being cut away). This wheel touches a spring every 2s and sends a signal through a relay. The 58th second is omitted in every minute. A wheel on the five minute arbor has a notch 10s long cut into its rim. Into this notch a detent falls once in five minutes, and the signals are interrupted every five minutes from 50s to 60s. The clock thus sends break-circuit signals (to its own "hack-contact relay at the switch-board) every 2s with the exception of the 58th second in every minute, and the 52d, 54th, 56th and 58th, in every 5th min-



ute. From the relay either break or make signals can be sent. On the pendulum rod just above the bob is a screw thread, on which a little nut can be moved up and down about three inches of the length of the rod. This nut is made in the shape of a pilot wheel with eight spokes, one of which has been painted black. The nut is so placed as to bring the correction of the clock to as nearly zero as possible at noon of each day.

The mean time and sidereal chronometers have all been furnished by Negus & Co. of New York.

Messrs. C. Frodsham & Co. have provided a thermometric chronometer which was delivered in 1885.

The three chronographs of the observatory are all of the American pattern of single pen chronographs invented by the Messrs. Bond.

Chronograph No. 3 is mounted in the Transit

with the poles of a battery and a current flows through the key, clock or chronograph circuit corresponding to the plug. If two, three or four plugs are put under any spring jack, a battery current flows through the two, three or four instruments with which the plugs are connected. Thus any keys, clocks and chronographs can be united in the same circuit by placing their plugs under any battery spring-jack.

#### Measuring Engine.

The measuring engine is mounted upon a pier in the instrument room. It is very solidly constructed of brass, and rests upon a tripod base with foot-screws for leveling. A frame at the top 13½ inches square is fitted with a system of tracks and carriages, giving two motions (at right angles to each other) to the large central microscopes, whose position is indicated by glass scales parallel to the tracks, and read by

#### The Meteorological Instruments.

Although the Lick Observatory was not primarily destined for a meteorological station, its very exceptional situation creates a responsibility on its part to engage to some extent in making routine meteorological observations, and a suitable outfit for this purpose has been obtained. Correspondence was begun in 1883, looking to the making of observations of earth temperature, and in 1885 regarding the very important research of earthquake measurements. The elevated and isolated site of the observatory will render researches on astronomical refraction of especial value, and the disposition of the buildings and instruments has been made with this end in view.

#### Draper's Self-Registering Barometer.

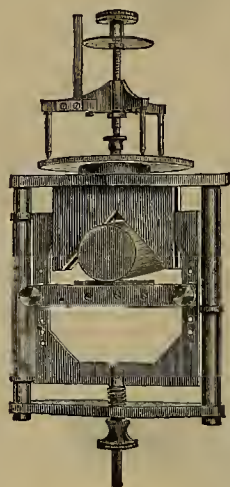
In the pencil barometer the glass tube is 36

brass frame *d*, fastened to the back of the case. This frame also holds the upper ends of the steel springs *e e'*. The glass reservoir *c* is of the same diameter and length as the upper part of the tube *a*; on its open end is turned a flange to hold it in a brass frame *f*, to which are fastened the lower ends of the steel springs *e e'*; it also carries an ink-pencil *g* that touches the ruled paper on the board *h h*, which is drawn aside by the clock *i*. The spring *e'* is for the correction of temperature on the other springs, as will be described below.

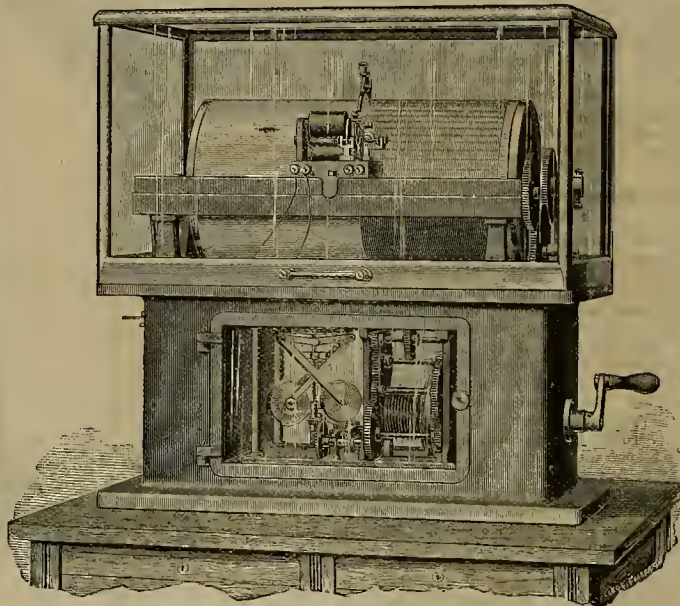
The springs for weighing the reservoir are of steel wire, No. 22 English wire gauge, closely wound round a mandril one-half inch in diameter and 10 inches long, on which they are tempered hard, and afterward lowered to a suitable temper by being dipped in oil and ignited two or three times, the burnt oil forming a japan that prevents them from rusting.



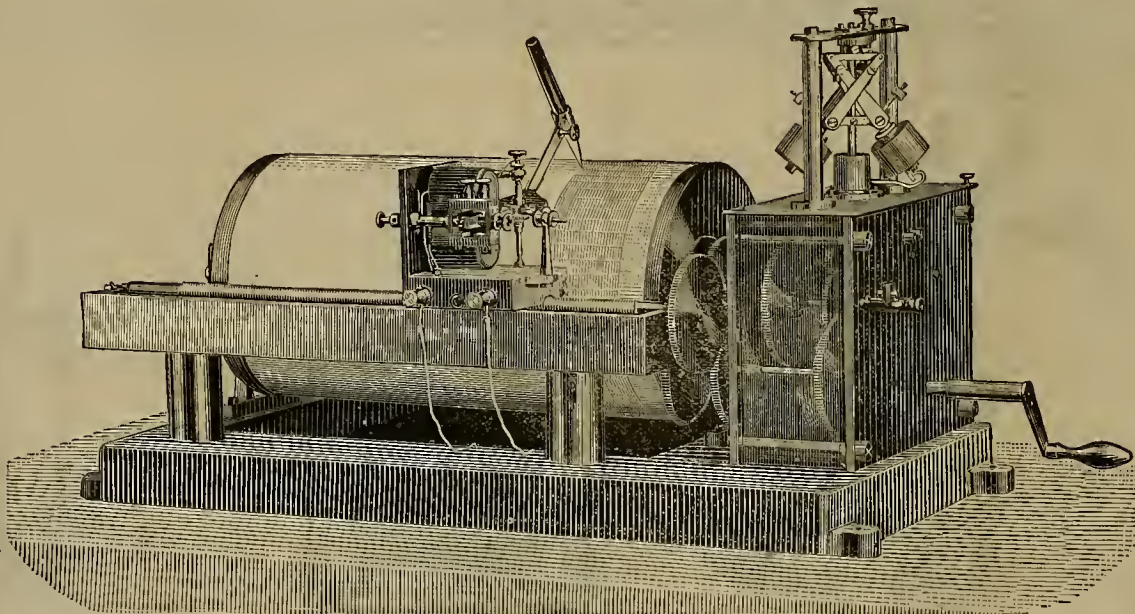
HOWARD MEAN-TIME CLOCK.



SPHEROMETER.



ELECTRICALLY-CONTROLLED CHRONOGRAPH.



THE FAUTH CHRONOGRAPH.

house. It was made by Fauth & Co. in 1881. No. 1 is mounted in the large dome. It was made by Fauth & Co. in 1886. Chronograph No. 4 is by Warner & Swasey, and is mounted in the meridian circle house. The movement of the barrel of this instrument is electrically controlled by the marking clock.

#### Electric Switch-Board.

An electric switch-board was made in 1884 by Royce and Marsan of Washington from designs of Prof. Holden. The general principle of the board is that every observing key, chronograph and clock is connected with the board by a double line of wire. The wires are run in the shallow cellars below the main floors and in a tunnel between the main building and the Transit house. The key circuit wires are covered with blue covering; the clock circuits with brown; the chronograph circuits with blue and white. The battery circuits are covered with red and white covering, and from each battery a double line is run to the switch board.

All the key, clock and chronograph circuits terminate in plugs which consist of two plates of brass, one to each wire, separated by hard rubber. The battery circuits terminate in spring-jacks, which are plates of brass pressed together by a spring, but so made that ordinarily they do not touch. Hence no current usually flows. If any plug is put under any spring-jack its opposite sides are brought into contact

auxiliary microscopes. The object to be measured is placed upon a glass stage below the upper frame, and this stage is carried by a positive circle 12 inches in diameter, divided on silver to 5' and read by two verniers 65". The sliding tracks are provided with standards carrying small telescopes, which, when directed to collimators, serve to detect any deviation of the carriage from a straight line and to determine the necessary corrections.

For use in connection with the measuring engine, Professor W. A. Rogers of Harvard College Observatory has provided a standard bar 20½ inches long, containing a half-yard divided into inches and tenths, with two inches at one end minutely subdivided. This bar is of steel, its upper surface being truly plain and polished.

#### The Level-Trier and Spherometer.

The Messrs. Repsold have furnished the Observatory with a level-trier of refined construction. It seems to be perfectly adapted for the investigation of level tubes under various circumstances of temperature.

A spherometer by the Messrs. Fauth was furnished with the four-inch transit together with an apparatus for measuring the irregularity of pivots according to the plan described by Prof. Harkness, U. S. Navy in "Monthly Notices of the Royal Astronomical Society," Vol. 38, page 487. The spherometer has various other applications in the Observatory.

inches in length, the upper portion being of a larger diameter than the lower; it is held firmly in a fixed position, and filled in the usual manner with quicksilver; its lower or open end dips into a tube or reservoir containing the same metal. This reservoir is suspended on two spiral steel springs, and has freedom of motion up and down. When the pressure of the atmosphere diminishes a portion of the mercury flows out of the tube into the reservoir; this becoming heavier, stretches the steel springs, causing the ink-pencil fastened to them to mark downward. If the pressure increases the reverse movement takes place. The ink-pencil makes its mark on a ruled paper register, carried at the rate of half an inch per hour from right to left by a clock.

There is a third steel spring of the same length and strength as those on the reservoir, stretched by a weight to a distance equivalent to 30 inches on the barometer scale. The object of this spring is to give the correction of temperature for those sustaining the reservoir. The movements of the mercury on the register can be magnified to any required extent by increasing the length of the spiral springs.

The tube marked *a b* in the cut is of glass; the upper part is of a larger diameter than the stem *a*, being three-fourths of an inch internal diameter and 10 inches long, while the stem *b* is one-eighth of an inch bore and 26 inches long. The total length of the tube is therefore 36 inches. The reservoir *c* is suspended from a

Steel springs for instruments are generally made too short and thick; that is, there is a very small range between their normal condition and limit of elasticity. These barometer springs may be stretched five times their length without taking a set, while in the instrument they are never extended more than twice their length. Heat has a slight effect on them, causing them to lengthen about 1-16 of an inch for 90 degrees Fahr. To allow for this, the third spring *e'* is weighted with a lead weight and pencil; it marks its fluctuations on the upper line of the register sheet. Otherwise this instrument gives the correction for temperature (or reduction to 32 degrees) from the fact that it weighs the mercury instead of measuring its length, which is affected by heat.

Ink pencils of the barometer and other instruments are made by drawing narrow glass tubing to a fine point, which lightly touches the paper register, leaving a mark of red ink that has been diluted with about one-quarter of its volume of glycerine. The glycerine prevents the ink from drying too rapidly. The advantage of this form of pencil over lead ones is that it requires little or no pressure to produce a mark.

To receive the register of atmospheric fluctuations, a suitable ruled paper is fastened by means of small brass clamps, *h h*, to the board, *h h*, which is hung by rollers to the thick steel rod fastened to the sides of the case, on which



the paper is carried from right to left by the clock, *i*, at the rate of one-half an inch per hour, by means of the pulley on the hour arbor of the clock. The wire that connects the register board to the clock is of soft steel, number 28 wire gauge. Having only one turn round the pulley, it readily slides, so that the board can be pushed sideways for the adjustment of time, or for the renewal of the sheet of paper.

#### Draper's Self-Registering Rain Gauge.

About two feet above the roof of the building is placed the usual circular rain-gauge receiver, marked *a*; it is eight inches in diameter, funnel-shaped at the bottom and leads into a black-tin pipe *b*, three-eighths of an inch in diameter. This gauge is mounted on a square box that will be described below. The pipe descends from the gauge to the receiving or gravity bucket *c*, which is made of brass and is of a triangular prismatic shape, balanced

The observatory has two mercurial barometers, one by John Roach of San Francisco and the other by H. T. Green of New York. The latter has a bore of fifty-five hundredths of an inch and its index is so arranged as to read directly the twentieths of English inches—the argument of the Pulkowa refraction tables. The Green barometer is hung in the meridian-circle house. The cistern is 4306 feet above sea level. The Roach barometer has its cistern the same height. Its scale gives English inches and thousands.

The self-recording anemometer or wind-gauge is of the U. S. Signal Service pattern, and was mounted on the roof of the central portion of the main building in 1884.

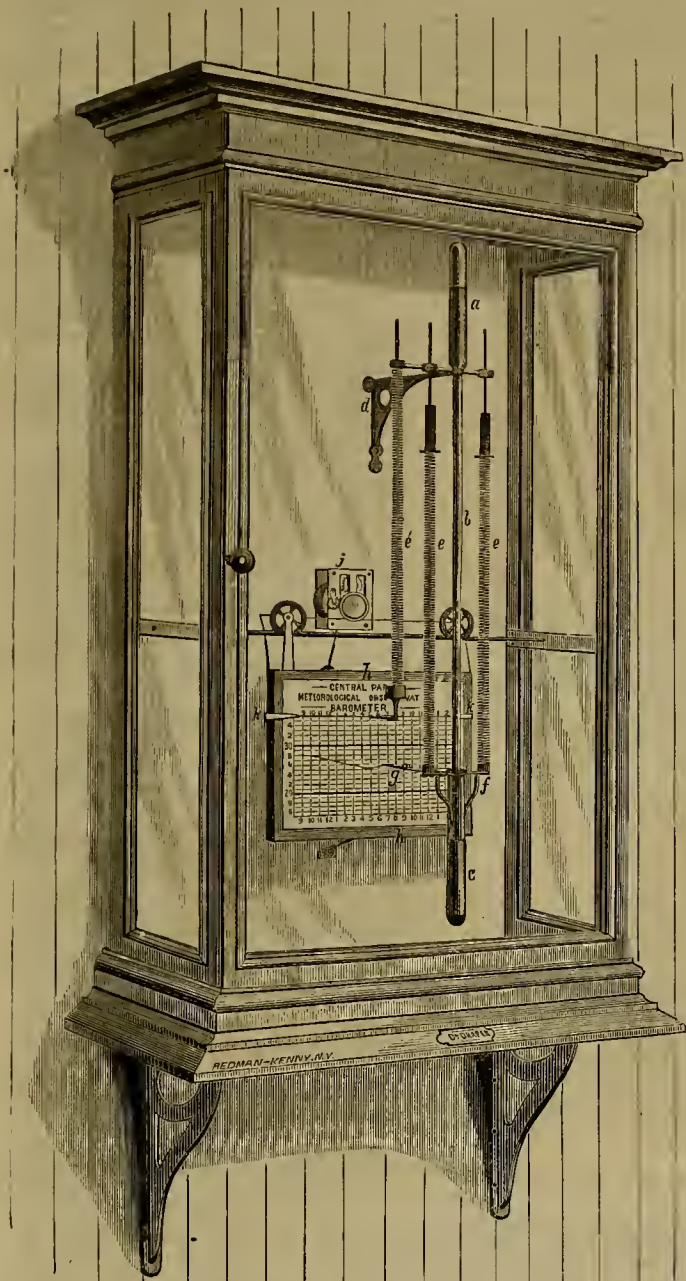
#### The Earthquake-Recording Instruments.

The Observatory possesses a set of earthquake recorders, made from the designs of Prof. J. A. Ewing of Dundee. The cuts and description

movement by resolving it into three rectangular components—one vertical and two horizontal—and registering these by three distinct pointers on a sheet of smoked glass, which is made to revolve uniformly by clockwork. A single earthquake always consists of many successive displacements of the ground, hence the record traced by each pointer on the moving plate is a line comprising many undulations, generally very irregular in character. The amplitude, period and form of each of these are easily measured, and by compounding the three we obtain full information regarding the direction, extent, velocity and rate of acceleration of the movement at any epoch in the disturbance.

This group of instruments is shown in Fig. 1. In the center is a plate of smoked glass which gets its motion through a friction-roller from a clock furnished with a centrifugal governor, acting by friction fluid, and balanced so that its speed is not sensibly affected by the shak-

at right angles to each other, but with their indices inclined so that they write side by side on one radius of the plate. The pendulums are supported on a single stand, but with independent adjustments for position and stability. Each has two pivots, consisting of hard steel points which turn in sapphire centers. At the pivots and at the tracing point's every effort has been made to avoid friction. The indices are of aluminum, and a part of their weight is taken by springs (not shown in the figure), so that their pressure on the plate may be no greater than is necessary to produce a trace on the sooty film. The vertical component of motion is recorded by the instrument which appears behind the clock. A massive bar, free to move vertically about a horizontal axis, is held up by a pair of long spiral springs. Its equilibrium is made nearly neutral by applying the pull of the springs at a suitable distance below the horizontal plane through the axis of support, in the



DRAPER'S SELF-RECORDING BAROMETER.

just above and forward of its center of gravity in a square frame *d*, by two pivots, one of them marked *e*. These allow it to tilt when the water has reached a certain height or quantity. The leaden weight *f* is an adjustable counterbalance for the regulating of the tilting of the bucket. The square frame which carries this bucket is suspended to two steel springs *g g*, placed as is shown in the drawing; that is, parallel to the register sheet, the object being that when the bucket is emptying the pencil rises from the register and makes no return mark. The upper ends of these springs are fastened by suitable means to the top of the case. Between the springs and attached to the square frame is an upright rod *h*, going through a steady bracket *i*, and on its upper end an ink pencil *j*, which delicately touches the sheet of paper moved sideways by the clock *k*.

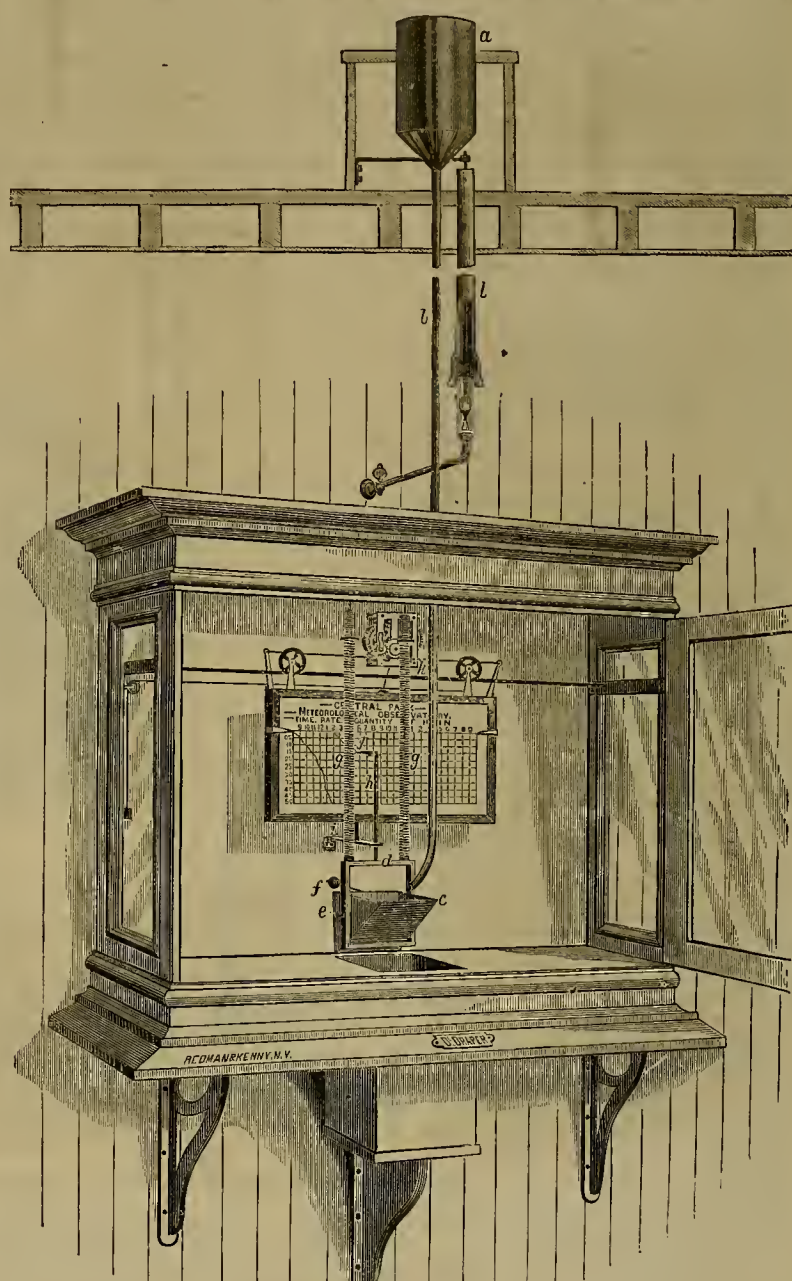
The square box alluded to in the preceding paragraph not only affords a support for the gauge, but retains warm air admitted from the gas-burner in the room below by means of an iron pipe *l*, which delivers the heated air close to the bottom of the funnel, melting any snow or sleet that may collect.

The funnel of the rain gauge is 36 inches above the roof, 33 feet above the summit level and 4333 feet above the sea.

are from *Nature* of August 12, 1886. There is a horizontal seismograph with clock and driving plate. The clock is started by an electric contact at the beginning of the earthquake, and the two rectangular components of the horizontal motion are registered side by side on a moving plate. There is a vertical-motion seismograph to register the vertical movement of the surface of the earth on the same plate. There is also a duplex pendulum seismograph, to give independent records of the horizontal motion on a fixed plate, the pencil being free to move in all azimuths. A chronograph attachment is used, which is set in motion at the beginning of a shock, and records the time of the occurrence by one of the standard clocks. It also marks the clock records on the revolving plate of the horizontal seismograph.

In the design of these seismographs (which we have before described in the *PRESS*) the object has been kept in view of making them easily capable of use by observers who have not made seismometry a special study. They are entirely self-recording and require little attention during the long intervals which must, in most situations, be expected to elapse between one period of activity and the next.

One group of instruments is arranged to give a complete record of every particular of the



DRAPER'S RAIN AND SNOW GAUGE.

ing of the ground. The clock is started into motion by means of a Palmieri seismoscope, which appears in the figure behind the plate on the right. This is a small common pendulum, whose bob carries at the bottom a piece of stiff platinum wire that projects into a recess in a cup of mercury below—the recess being formed by an iron pin standing lower than the surface of the surrounding mercury. On the slightest shaking of the ground, contact with the edge of mercury takes place, and this closes a circuit which releases an electro-magnetic detent and starts the clock. This occurs during the preliminary tremors which are usually found in advance of the main movement of an earthquake. The same circuit starts another clock (of the escapement type), which fulfills two functions: It marks time on the revolving plate during a part of the first revolution, and then continues to go as an ordinary clock, so that, by inspecting its dial afterward, the interval which has elapsed from the occurrence of the earthquake is known, and the date of the shock in hours and minutes is thus determined with as much precision as the phenomenon admits of. This part of the apparatus is omitted from the figure.

The two horizontal components of motion are recorded by a pair of horizontal pendulums set

manner described in the article, to which reference has already been made. A bell-crank lever with a jointed index gives a multiplied trace of the apparent vertical oscillations of the bar, which correspond to vertical displacements of the ground. In this instrument, as in the others, sapphire centers are used to minimize friction.

Records inscribed on the plate are preserved by varnishing the plate and using it as a negative to print photographs. The motion, as recorded, is magnified to an extent which experience of Japanese earthquakes has shown to be desirable in dealing with disturbances ranging from those which are just recognizable as earthquakes up to those which are, to some extent, destructive. For great earthquakes, separate apparatus of the same type is designed, in which the multiplying indices are dispensed with, and the scale and style of the other parts are considerably modified.

Another and distinct instrument is the duplex pendulum seismograph, shown in Fig. 2. A massive bob is hung by three parallel wires from the top of a three-cornered box, and is reduced to nearly neutral equilibrium by being coupled by a ball-and-tube joint to the bob of an inverted pendulum below it. The two form a system which can be made as nearly astatic as



is desirable, and so furnish a suitable steady point for the horizontal part of earthquakes movement in any azimuth. The motion is magnified and recorded by a vertical lever geared to the upper bob by a ball-and-tube joint supported on gimbels from a bracket fixed to the box, and furnished with a jointed index which writes on a fixed plate of smoked glass. Records of the kind which the duplex pendulum gives are, of course, incompletes in two important particulars; they show nothing of the vertical motion (which, however, is usually a comparatively small part of the whole) and they show nothing of the relation of time to displacement throughout the disturbance. But they exhibit very clearly the change of direction which the movements undergo, and the actual direction taken by any pronounced element of the shock.

### The Transfer.

On Friday, June 1st, the Lick Trustees, represented by Trustees Mastic and Plum and James T. Boyd, attorney for the Trustees, formally transferred to the University Regents, represented by Regents Hagar, Hallidie and Phelps, and John B. Mhoon, the attorney for the Regents, the Lick Observatory on Mount Hamilton, with all its appliances and appurtenances.

R. S. Floyd, President of the Lick Trustees, who was unable to be present, owing to his illness, sent the following statement, which details the history of this great undertaking from its inception to its completion and transfer:

To the Regents of the University of California—GENTLEMEN: The third trust in the deed of trust of Mr. James Lick reads as follows:

Third—To expend the sum of seven hundred thousand dollars (\$700,000) for the purpose of purchasing land, and constructing and putting up on such land, as shall be designated by the party of the first part, a powerful telescope, superior to and more powerful than any telescope ever yet made, with all the machinery appertaining thereto, and appropriately connected therewith, or that is necessary and convenient to the most powerful telescope now in use, or suited to one more powerful than any yet constructed; and also, a suitable observatory connected therewith. The parties of the second part hereto and their successors shall, as soon as said telescope and observatory are constructed, convey the land whereupon the same may be situated and the telescope, observatory and all the machinery and apparatus connected therewith, to the corporation known as the "Regents of the University of California," and, if, after the construction of said telescope and observatory, there shall remain of said \$700,000 in gold coin, any surplus, then said parties of the second part shall turn over such surplus to said corporation, to be invested by it in bonds of the United States, or of the city and county of San Francisco, or other good and safe interest-bearing bonds, and the income thereof shall be devoted to the maintenance of said telescope and the observatory connected therewith, and shall be made useful in promoting science; and the said telescope and observatory are to be known as "The Lick Astronomical Department of the University of California."

Richard S. Floyd, Charles M. Plum, George Schonewald and Edwin B. Mastic, surviving trustees of the James Lick Trust, have the honor, gentlemen, through me, their president, to report that:

First—We, together with our co-trustee, William Sherman deceased, have by purchase, and through gift by Congress, procured the necessary land at the site selected by Mr. James Lick himself for his observatory. This site is the summit of Mount Hamilton, in Santa Clara county, Cal., and the land secured amounts to 1571.59 acres.

Second—That after cutting off more than 75,000 tons of solid rock, to level the western summit of this land, "designated by the party of the first part," we have now successfully "constructed and put up" thereon, a powerful telescope which is "superior to" and is "more powerful than any telescope ever yet made." That we have provided it with all the "machinery appertaining thereto and appropriately connected therewith, or that is necessary and convenient" to this great telescope, "more powerful than any yet constructed," and that we have also completed the construction of a suitable observatory connected therewith.

Third—And that in further pursuance of this third trust the Lick Trustees are now practically ready, and offer to deliver and convey to you this land, telescope and observatory and \$90,000 in gold coin of the United States, and afterward whatever balance of the settlement of all accounts will show to be remaining of the \$700,000 set apart by Mr. Lick for this object.

Volume I, "Lick Observatory Publications," gives detailed descriptions of all the subsidiary instruments of the observatory. The instruments obtained since are immediately appurtenant to the great telescope, such as the star spectroscope, filar and duplex micrometers, photographic apparatus, etc., and are listed in an inventory to be submitted to you with the deeds of conveyance. Detailed and scientific description of these and of the great telescope will probably be left to your director for the next volume of "Lick Observatory Publications." The subsidiary equipment is considered excellent, but, of course, all such instruments have been made before and gave little trouble beyond ordering the most modern patterns from the best makers.

What really makes the Lick Observatory is the great telescope, with its machinery and its peculiar but splendid situation. To attempt a telescope greater than any ever yet made in the world involved new and experimental work, and in adapting it to its fit and proper site the peculiar circumstances of an exposed mountain peak new difficulties and problems constantly confronted us.

The most momentous question of all that have arisen in this work respected the style of telescope that should be attempted in order to achieve the most powerful instrument possible—whether a great refracting telescope or a great reflecting telescope. The most eminent astronomers of the world were divided or undecided upon this question. With the light of the best opinions, pro and con, a practical

consideration of the atmospheric conditions of our exposed site determined the trustees to decide in favor of a great reflector. It is doubtful if a very large reflector could have its power practically realized at a sight like Mt. Hamilton.

I do not propose to enumerate the many and varied difficulties encountered in accomplishing this observatory. There have been delays and disappointments, but these are unavoidable in a work of this kind. Time in such work is as insignificant a consideration as would be the danger that the heavens might fly away before we got ready to look. Considering all things, the trustees feel a grateful surprise that this observatory, with the most powerful telescope in existence, is an accomplished fact at all. Not until the great objective had safely arrived at the observatory on December 27, 1886, could the trustees feel any assurance that such would be the case. Then came the anxieties with the risks of transportation, of the mounting and the photographic lens, until December and January last. Any accident to these might have consumed the entire fund without completing the observatory as it now is. We feel reason to congratulate ourselves that more than our most sanguine expectations have been realized.

It was the special desire of Mr. Lick that this work should not be carried out according to one man's particular notions, nor built according to any single groove. The trustees have earnestly endeavored to carry out this broad idea of the donor.

FIG. 1.—Complete Three-Component Seismograph, for Motions in all Directions.

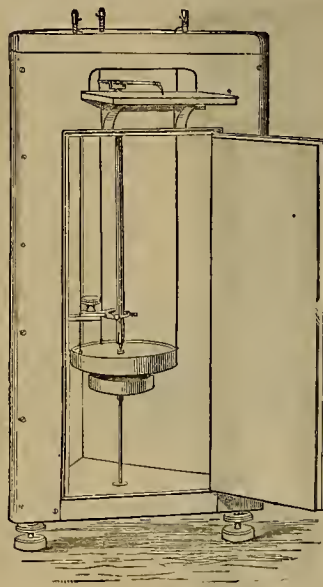
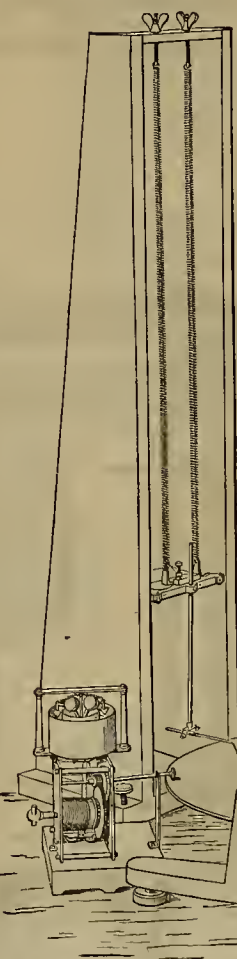


FIG. 2.—Duplex Pendulum Seismograph for Horizontal Motion.

### SELF-REGISTERING INSTRUMENTS FOR RECORDING EARTHQUAKES.

and in the Lick Observatory we submit to you a work which is the resultant of the most carefully studied and thoroughly discussed selections from the best advice and information that the trustees could obtain from the most eminent astronomers and the most famous opticians and mechanicians in the world. To gather from many sources the best information on every point and to shape the best ideas into a great observatory on a remote mountain has been no easy task.

Confident that the Lick Observatory will soon speak for itself in the world of science and to the honor and fame of our University of California, I am very truly yours, (signed) R. S. FLOYD, President Lick Trustees.

The deed of transfer was elaborately engrossed on parchment. It was decided that a public transfer of the observatory to the University, with appropriate speeches and ceremonies, be made at Berkeley on Commencement Day. Thomas E. Frazer, who was superintendent of construction at Mt. Hamilton, and who was present at the transfer, was deputed as messenger to convey to Mr. Robey, in charge of the observatory, notice of the transfer having been made, and to instruct Prof. E. S. Holden that he had been placed in sole charge of the observatory for the Board of Regents.

The trustees are preparing a medalion of James Lick to be placed on the pier of the great telescope, and marble tablets commemorative of those engaged in the work to be placed on the walls.

On Wednesday of next week, June 27th, which is Commencement Day at the University, the public ceremonies connected with the formal transfer of the Observatory will take place at Berkeley.

### The Organization.

The complete organization of the "Lick Astronomical Department of the University of California" is as follows:

HON. HORACE DAVIS, President of the University;  
EDWARD S. HOLDEN, LL. D., Director and Astronomer;  
SHERBURNE W. BURNHAM, A. M., Astronomer;  
JOHN M. SCHAFERBERG, C. E., Astronomer;  
JAMES E. KEELER, A. B., Astronomer;  
EDWARD F. BARNARD, Astronomer;  
CHAS. B. HILL, Asst. Astronomer, Sec'y and Librarian;

JOHN McDONALD, Machinist;  
CHARLES HARKORT, Janitor;  
CHAS. MCGUIRE, Laborer.

### Professor E. S. Holden,

The Director of the Lick Observatory.

Prof. Edward S. Holden has been identified with the Lick Observatory almost since its inception, having been consulted by the Lick trustees concerning the various important steps to be taken in the construction and equipment as the work progressed. When he was chosen by the Regents of the University of California as president of that institution of learning it was understood that when this observatory was

servers with the great 26-inch equatorial. Other astronomical researches in which he has been engaged with noticeable success are the distribution of the stars and the rectification of important star catalogues. In this former, he has carried on laborious observations and reductions in correction or reversal of the long-accepted hypothesis of the elder Herschel, that star distribution, taking the celestial regions as a whole, is quite uniform. Professor Holden's results tend, on the contrary, to show the decided non-uniformity of the general distribution.

In 1833 he conducted the Government expedition to the South Pacific to observe the transit of Venus. This work and results of this expedition are regarded as of the highest character. A similar quality is recognized in those of this Government party, likewise in his charge, sent to Colorado in 1878, to observe the total eclipse of the sun, with a view, particularly, to ascertain the nature of the corona. In 1881 he was appointed professor of astronomy in the University of Wisconsin, and Director of the Washburn Observatory at Madison in that State. There he engaged largely in researches on comets and star distribution.

The Wisconsin State Journal says of his work: During the five years of Professor Holden's administration, three volumes of the publications of the Washburn Observatory have been printed, and a fourth volume is ready for the printer. The astronomers have discovered and measured many new double stars, new nebulae, etc., and have lately been engaged in determining the positions of 303 fundamental stars for the southern zone of the Astronomische Gesellschaft. A number of important researches on the latitude of the observatory, on the astronomical refraction, etc., are far advanced, but must be left to be completed by Professor Holden's successor.

Professor Holden is well known as a writer in the field of his favorite sciences, partly as the joint author, with Professor Simon Newcomb, of notable mathematical and astronomical textbooks, but in a more important sense as an independent author. Besides his original researches, he has given to the public a life of Sir William Herschel, a work based on original materials previously inaccessible, and distinguished by every merit proper to the biography of a man of science. In this, as in all his writings, he shows himself not only the master of his technical specialty, but as a man of large general culture. He superintended the mounting of the instruments at the Lick Observatory. These have been mainly manufactured under his instructions, and are all of the most modern design, and the best calculated to perform the work required of them.

Prof. Holden has received the following honorary degrees: LL.D., University of Wisconsin (1886); LL.D., Columbia College (1887). He is a member of National Academy of Sciences (Washington), Philosophical Society (Washington), Amer. Ass'n. Adv. Sci. (Salem), Cal. Acad. Sciences (S. F.), Cal. Historical Society (S. F.), German Astronomical Society (Leipzig), Corresponding Member of Appalachian Club (Boston), Microscopical Society (S. F.), Acad. of Sciences (St. Louis), Honorary Member Rensselaer Society of Engineers (Troy), Honorary Associate Liverpool Astronomical Society, Associate Fellow American Acad. Arts and Sciences (Boston), Foreign Associate Royal Astronomical Society (London).

While Professor Holden was president of the University, he prepared, under the direction of the Lick trustees, Vol. I of "Publications of the Lick Observatory of the University of California." This work of some 300 pages gives a history of the Observatory and descriptions of some of the appliances.

The most valuable portion of the volume to the scientific reader, and what will most interest astronomers, is embraced in the various tables. As a general rule, during the first year of practical work of an observatory, a large amount of time is consumed in preparing necessary tables. But the astronomers will find all this done for them by Professor Holden. The tables are the most complete ever published, so that the work ought to be reduced with great accuracy. Any one who will examine these tables intelligently will readily understand that Professor Holden certainly occupied well what time he could spare from active duties at the University while president.

Table I gives the star factors  $A$ ,  $B$ ,  $C$  and  $D$ , for every 10' of declination from 47° to 40' south declination to north 80°. These are the usual factors for azimuth, level and collimation of the transit instrument; the fourth quantity,  $D$ , is the numerical value of the tangent of the declination, which is used in the computation of Bessel's method, wherein the "constants" of the transit are supposed to vary but little and are known. The second part of the same table includes the same factors for every individual star of the Berliner Jahrbuch, computed for the period 1900, and with the changes for 100 years.

Tables III, IV and V comprise extensions of Bessel's well-known refraction tables, with correction for the atmospheric and barometric conditions prevailing at the altitude of the observatory; also differential refractions in right ascension and declination for the circle and micrometer observations. They are preceded by a discussion on the theory by Prof. Comstock, who has elaborated all the terms of the formula to meet all possible conditions.

Table VI is an extended tabulation of the sun's parallax in right ascension and declination, with auxiliary lists for extending the ta-

completed he would resign from that position and assume the directorship of the Observatory, and this program has been carried out. The Observatory, under the terms of the James Lick trust deed, is under the general control of the University Regents.

Prof. Holden has achieved a wide and lasting reputation as an astronomer, and the value of his work is thoroughly recognized in the scientific world. His unusual attainments in mathematics were acknowledged early in his life. He graduated from the scientific department of the Washington University as B. S. with the highest distinction in 1866. With the view of a mathematical career, he secured an appointment as cadet in the United States Military Academy. Here he graduated in the foremost rank in 1870. The exceptional extent of the preparation for the West Point course, which his college graduation and his rare opportunities that a great mathematical mind had given him, enabled him to devote an unusual amount of time outside of his class routine to the private mathematical studies that formed his absorbing pursuit. He was Second lieutenant of the Fourth United States Artillery from 1870 to 1872, when he became Second-lieutenant, United States Corps of Engineers. In 1873 he resigned, and was commissioned Professor of Mathematics in the United States Navy, which commission he resigned in June, 1882. He was Assistant Professor of Natural and Experimental Philosophy at West Point, 1871-72, and Instructor in Practical Military Engineering, 1872-73. In 1873 he was appointed Astronomer of the United States Naval Observatory at Washington. He was there long one of the ob-



bles to other parallaxes of the heavenly bodies, and for adapting the same tables to other observatories.

Table VII gives the hour angles and azimuths of a body in the horizon; and VIII the true zenith distances for the latitude and elevation of the Lick Observatory.

Tables IX to XIV are tabulations of several quantities useful in abridging the work of computation, to be undertaken by Prof. Holden and his assistants; and the six other tables which conclude the list are copied from the Leipzig observations (as stated in the introduction), and do not particularly appertain to the location of the Lick Observatory.

S. W. Burnham.

S. W. Burnham of Chicago is a most distinguished astronomer. He is a Fellow of the Royal Astronomical Society and a member of the German Astronomical Society of Berlin. He is a regular contributor to the Royal Society Monthly Notices. His specialty is the discovery and measurement of double stars, with the correction, codification and arrangements in the order of right ascension, of the work that has been done by previous observers—the Herschels, Struves and others. His "General Catalogue of the Double Stars" will soon be printed by the Naval Observatory at Washington, and will comprise a work of some 500 pages. All the discoveries and observations which gave him such a reputation abroad have been done with a six-inch telescope. The work done with this has tested the sight of the best European observers.

At the suggestion of Prof. Holden, the Lick Trustees invited Mr. Burnham to Mt. Hamilton in 1879 to test the site of the observatory astronomically. This report is printed in Vol. 1 of the "Publications." When Prof. Holden was elected director of the Lick Observatory, his first nomination for any position was that of Mr. Burnham. Up to this time he has had to support himself as a stenographer, and only "followed" astronomy in his leisure moments. Mr. Burnham is a skilled amateur photographer, and at the recent meeting of the National Association of Photographers at Chicago the gold medal was awarded to him above all the professionals. He will have a chance here to test his skill with the fine photographic lens of the Lick Telescope. An eminent astronomer, in speaking of Mr. Burnham, says: "He is the greatest double-star observer that ever has lived; he is the greatest double-star observer now living, and the greatest that ever will live."

J. M. Schaeberle.

Professor Schaeberle is of German birth (born in 1854) but came to this country as a child. He served his apprenticeship as a machinist. During that time he procured a small telescope, and went back to school desiring to become an astronomer. When he graduated at the University of Michigan in 1876, he was appointed assistant to Prof. Watson, director of the Ann Arbor Observatory. He was gradually promoted until he became assistant professor of astronomy in the University.

He has built several reflecting telescopes with his own hand. His astronomical work has been mainly observing with the meridian circle, and his numerous papers published in the astronomical journals have been upon problems connected with meridian circle work usually. He has discovered two comets with telescopes made by himself.

James E. Keeler.

James Edward Keeler was born in La Salle, Illinois, September 10, 1857. As a boy he was always fond of mechanical and scientific pursuits. In 1869 he went to Florida with his parents, and in 1875 and 1876 was engaged in surveying around the mouth of the St. Johns river, and became interested in astronomy by endeavoring to find a meridian line. He began astronomical observations at this time with a telescope and transit instrument of his own construction, and also studied for college. In 1877 he went to the John Hopkins University in Baltimore. He observed the total solar eclipses of July 29, 1878, with the party in charge of Professor Holden, at Central City, Colorado.

Mr. Keeler graduated (A. B.) from the university in June 1881, and was engaged by Prof. Langley as an assistant on an expedition to Mount Whitney, Cal., to observe the sun from a great elevation. On returning from Mt. Whitney, he remained at the Allegheny observatory to assist in preparing the results of the expedition for publication. In May 1883 he went to Europe and studied physics with Prof. Quincke in Heidelberg and Prof. von Helmholtz in Berlin. On returning, after 14 months absence, he was again engaged as a regular assistant at the Allegheny observatory, working principally on the determination of obscure wave-lengths, and the distribution of energy in the lunar spectrum.

Mr. Keeler was appointed assistant astronomer under the Lick Trust in April 1886, and has resided on Mount Hamilton since that time. He was appointed astronomer in the Lick observatory January 14, 1887, to date from the official transfer of the observatory.

Most of the work done at Allegheny is embodied in the publications of the observatory, and at Mount Whitney in the official report of Professor Langley (Professional Papers of the U. S. Signal Service, No. XV). Other published papers of Mr. Keeler are the following:

Report on the Total Solar Eclipse of July 29, 1878, Washington obs. for 1876.

The Transit of Venus of Dec. 6, 1882, *Sidereal Messenger*, Feb. 1883.

On Repolishing Optical Surfaces of Rock Salt, *Sidereal Messenger*, July, 1886.

The Absorption of Radiant Heat by Carbon Dioxide, *American Journal of Science*, Sept. 1884.

The Total Eclipse of the Moon, June 11, 1881, *Sidereal Messenger*, July, 1881.

Article "Bolometer," *Encyclopædia Britannica*, supplement.

The Time Service of the Lick Observatory, *Sidereal Messenger*, September and October 1887.

Electrical Contact Apparatus for Astronomical Clocks, *Sidereal Messenger*, Jan. 1888.

First Observations of Saturn with the 36 Inch Equatorial of the Lick Observatory, *Sidereal Messenger*, Feb. 1888.

Mr. Keeler is also the writer of many newspaper articles. He has never joined any societies or associations.

The special work on which he will be engaged at the Lick observatory will be spectroscopic observations with the great telescope, and physical observations in general.

E. E. Barnard.

Edward Emerson Barnard was born in December, 1857, in Nashville, Tennessee. His mother was early left a widow, and our young astronomer was her only support. He entered the employ of a photographer, and, by hard study during his leisure hours, soon became familiar with the great science of astronomy, and, first with a "spyglass" and then with a more pretentious telescope, he began systematic work, studying at the university in the mean-

time. Several brilliant discoveries attracted attention to his work, and his profession of photographer was given up in 1883 to accept a position as astronomical observer at the Vanderbilt University Observatory, having charge of that observatory until September, 1887, when he resigned his position and that of instructor in astronomy in the Vanderbilt University to accept the position of astronomer at the Lick Observatory.

He graduated from the School of Mathematics of the Vanderbilt University in June, 1887.

He was elected Fellow of the American Association for the Advancement of Science in 1885, and in February, 1888, was elected Fellow of the Royal Astronomical Society of London.

In 1879-80 he made a special observational study of the planet Jupiter with five-inch refractor, making a complete series of drawings and observations of that planet.

In 1881 he began comet-seeking and miscellaneous observations, and through patience and perseverance discovered the following comets: Sept. 17, 1881, discovered comet 1881 VI; Sept. 13, 1882, discovered comet 1882 III; July 16, 1884, discovered comet 1884 II, short period (5.3 yrs.) comet; July 8, 1885, discovered comet 1885 II; Dec. 3, 1885, discovered comet 1886 II; Dec. 27, 1885, discovered comet 1885 V, (independent discovery); Oct. 4, 1886, discovered comet 1886 IX; Jan. 23, 1887, discovered comet 1886 VIII; Feb. 16, 1887, discovered comet 1887 III; May 12, 1887, discovered comet 1877 IV. He also discovered a group of companion comets to the great comet of 1882, and was the first person to discover and announce the breaking up of the nucleus of that comet.

He discovered the duplicity of the seventh magnitude star Beta, one Capricorni, on Nov. 6, 1883, at the moment of occultation by the moon. This star could not be seen as a double in the telescope with which its duplicity was discovered. This peculiar discovery was made by noting that the disappearance of the star was not absolutely instantaneous, as it would have been if it had a single star. He published his observation and his expectation that he had discovered a close double star which was con-

firmed by some of the giant telescopes of the country.

He has already discovered 7 new nebulae since he began his work at the Lick Observatory, making 30 altogether that he has found.

He experimented at the Vanderbilt Observatory in celestial photography, making a number of good photographs of the moon with the 6-inch refractor. He has made a special study of the Gegenschein, a peculiar zodiacal phenomenon; also of the trains of meteors, with special references to air currents in our upper atmosphere. He has published numerous astronomical papers in the *Astronomische Nachrichten*, *Gould's Astronomical Journal*, *Sidereal Messenger*, *Science* (of N. Y.), etc.

At the Lick Observatory he will be engaged in celestial photography, comet-seeking, and observations with the 36-inch equatorial and smaller telescopes.

Charles B. Hill.

Charles B. Hill, assistant astronomer, secretary and librarian, is well known in this city, where he has resided since 1873. Mr. Hill was born in Philadelphia, Pa., Sept. 17, 1863. He attended the West Pennsylvania Square Academy, Philadelphia, and the Tamalpais Academy, San Rafael, and afterwards Heald's Business College, graduating from the latter institution in 1876. He graduated from First-Grade Lincoln School, in this city, in 1887, and from the Boys' High School in 1880. He gave up the Harvard Post-Graduate preparatory class and entered the employment of Prof. Geo. Davidson, sub-office U. S. Coast and Geodetic Survey in San Francisco in 1881. Mr. Hill became interested in astronomical work in the

## Naming Mt. Hamilton.

The following letter from Prof. Wm. H. Brewer, so well and favorably known on this coast and elsewhere, settles all doubts as to the naming of this mountain made famous by the erection of the Lick Observatory. It effectually discards the weak story that the mountain was named after some rancho in the vicinity named Hamilton:

Yale University, Sheffield Scientific School, }  
New Haven, Conn., January 31, 1888. }

Mr. A. T. Dewey, San Francisco, Cal.—

DEAR SIR:—Yours of the 4th ult. is just received, asking me for the facts concerning the naming of Mt. Hamilton, upon which the Lick Observatory is located, etc.

I made the acquaintance of Rev. Laurens Hamilton at Ovid, N. Y., in 1853, where his first pastorate was, and where he remained about two years—1853 to 1855. I was then a teacher in the "Ovid Academy," as was also Miss Isabella Mead, whose acquaintance he there made and whom he married in May, 1855, just before his starting for California. Certain personal matters, which need not be given, made our mutual friendship with both him and his wife especially intimate and pleasant. I next met him in August, 1861, when, in charge of the little field party of the State Geological Survey, I camped in the suburbs of San Jose, where Mr. Hamilton was then preaching, and during our short stay there I was often at his house. Prof. Chas. F. Hoffman, topographer of the State Survey was with us, and thus became acquainted with Mr. Hamilton.

We had already been on all the chief points about San Jose, Pacheco's Pass, New Almaden, etc., and from various points had noted about where the highest point in the mountains east of the Santa Clara valley was located.

On Sunday I attended Mr. Hamilton's church, and, in the afternoon, took tea with him and mentioned that we would attempt to reach the highest peak east on the next day. He wanted to go with us, and early the next morning (Monday, August 26, 1861) he was at our camp. He, Mr. Hoffman and I made up the party.

There were no special difficulties met with, other than those incident to the absence of tracks, the occasional fields of brush, and our ignorance as to the best route. There were no trails, nor had I obtained any information of the country beyond the laguna (probably at Smith's creek). We finally picketed our mules and made the last three miles on foot. Hoffman and I were encumbered with our instruments, and, as we neared the summit, Mr. Hamilton pushed on ahead of us, and reaching it, swung his bat in the air and shouted back to us: "First on top—for this is the highest point."

The air changed to be unusually clear for the time of year, and the views were correspondingly fine, especially to the westward.

Night caught us while still in the mountains, but we reached our camp before midnight.

I thought it probable that this peak which is somewhat conspicuous from the heights on the opposite side of the valley, must have already some name, but I failed to find any. I made diligent inquiries then and later both thereabouts and elsewhere. Indeed, any definite information about the interior of that chain was seriously scanty, considering how long the Santa Clara valley had been settled. It had been well prospected over between 1849 and 1860, but beyond the fact that paying gold was not to be found in the streams, and that there were plenty, I got little information.

When we worked up our notes in the office, and failing to find any old name in use, Hoffman and I, after discussing two names, agreed to call it Mt. Hamilton.

This is how it happened that the now celebrated mountain came to bear the name of that able and true man.

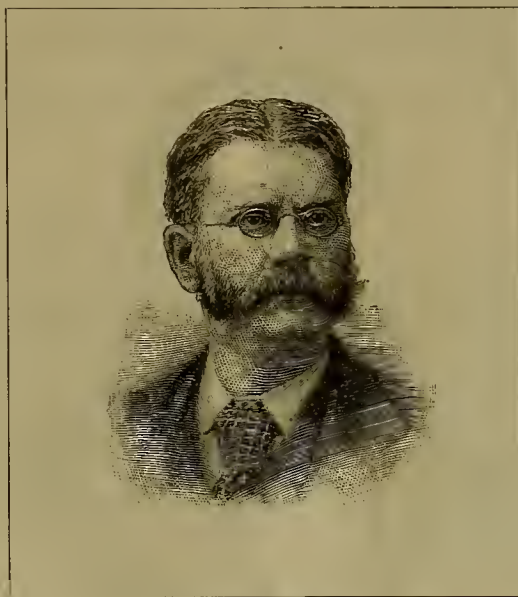
I have a clear remembrance of the events, and I write this letter after referring to my original notes made at the time.

Yours Truly, Wm. H. Brewer.

The Rev. Dr. Hamilton was a well-known divine on this coast, and a very popular one in Oakland, where he resided for many years. He was a man of progressive spirit, a deep thinker, and a writer of ability. He "died in harness," as the saying goes, being suddenly stricken while in the pulpit delivering a sermon. In view of what has been stated in the above letter his name was fittingly bestowed upon the now famous mountain, from the summit of which, by the way, the old home of James Lick, who originated and endowed the Lick Observatory, may be seen.

**SALARIES.**—The salary of Prof. Holden as Director and Astronomer of the Lick Astronomical Department of the University of California is \$5000 per annum; that of S. W. Burnham, astronomer, \$3000; J. M. Schaeberle, astronomer, \$2000; J. E. Keeler, astronomer, \$1400; E. E. Barnard, astronomer, \$1200; C. B. Hill, secretary, \$1000; John McDonald, machinist, \$700; Chris. McGuire, laborer, \$720, and Charles Harkort, janitor, \$720.

THE reports on Mt. Hamilton geology were made by Prof. C. R. Van Hise, of the University of Wisconsin, and Prof. A. Wendell Jackson, of the University of California.



E. S. HOLDEN, DIRECTOR OF THE OBSERVATORY.



## James Lick.

The philanthropy of James Lick has made his name more famous than that of any other Californian. For some time before his death (which occurred in October, 1876) he was engaged in plans for devoting his great wealth to the benefit of the public. His dissolution was painless and peaceful. The body was free from disease, and death was simply the result of the complete wearing out of the system. He had been gradually sinking for the previous ten days, and he was fully conscious of his earthly career was rapidly drawing to a close. He conversed cheerfully of his approaching death, and manifested a spirit of thorough resignation. His thoughts were chiefly centered on the execution of his will as expressed in the deed of trust, and his conversations related principally to the consummation of his public benefactions. The only regret with which he surrendered his life was that he was not permitted to see his various projects carried out.

Although Mr. Lick, whose portrait is published in this number of the PRESS, was a resident of California for many years, he was very little known even in San Francisco, being a man of eccentric and peculiar habits and avers to mixing with his fellows. When, however, he suddenly announced his intention of giving his immense fortune to scientific and charitable objects, his name and fame was spread abroad through the land, and no Californian was better known abroad than James Lick. The money which he had accumulated during his long life was given to a board of trustees, who were to carry out the plans devised by the donor on broad and generous principles. The philanthropist changed the board of trustees several times, which led some persons to believe that he had repented of his resolution, but in each instance the property was turned over to a new board in the same manner as to the first. He also changed the trust deed once, by modifying certain bequests, increasing others, and leaving a certain amount of money to his relatives.

Whatever may have been his reasons for making the change, the fact remains that the bulk of his immense wealth is being distributed in various practical ways to the people. He was considered an eccentric man, but surely the eccentricity which leads a millionaire to divest himself of property valued at millions and give it, during his lifetime, to the people among whom he lived, is to be commended. This he did, and whatever may have been his idiosyncrasies, the crowning act of his life shows that the heart was in the right place and that his fortune was bestowed in accordance with long-cherished convictions and matured plans. Mr. Lick was a man whom even those nearest to him did not understand or appreciate. He never had credit for the sterling qualities he possessed. His greatness of wisdom and generosity will be more and more appreciated as the years roll on and all his bequests are carried out.

For presenting a biographical sketch of James Lick the materials are meager. He lived in seclusion, and even when engaged actively in business pursuits was little known even to those with whom he was brought in contact. He was born August 25, 1796, in Fredericksburg, Penn. He was a descendant of one of the Revolutionary fathers, William Lick, who emigrated from Germany to America previous to the war of Independence, in which he took an active part. James Lick was taught the trade of a cabinet-maker and carpenter, and served for a while in a pianoforte manufactory in Baltimore, Maryland.

His restive spirit, however, attracted him in 1820 to Buenos Ayres, and there he remained for 12 years, accumulating by industry and his speculative insight the good round capital of \$40,000. For a season Mr. Lick returned to Pennsylvania, and seriously bent himself toward establishing a manufactory of pianofortes in Philadelphia, but after leasing ground and erecting buildings he gave up the project and returned to Buenos Ayres. Matters were there not to his liking, and he is heard of next at Valparaiso, in Chili, where commerce and pianos gave him occupation for a few years. From Chili he went to Peru, and there devoted himself to his business in cabinet-work and pianofortes for 10 or 11 years.

Mr. Lick arrived in San Francisco in 1847, having with him his entire wealth, amounting to the sum of \$30,000. He invested all his capital and all earnings in real estate. The most promising portion of the city in those days was then what is known as North Beach. Most of Mr. Lick's investments were made in that locality, and owing to the subsequent abandonment of that section as a business center, advanced but little in value. He extended his investments, however, to other parts of the peninsula which have since become the very heart of the great city. Then the lots he purchased were more and more and cost him but a trifle. The lot on which the Lick house now stands is said to have been bought by him for an ounce of gold. All the city property, outside of North Beach, in which Mr. Lick invested, multiplied in value rapidly and he built up the immense fortune which he in later years enjoyed. He also invested money in Santa Clara and Los Angeles counties, purchasing in the latter county a portion of the Rancho de Los Felis and the island of Santa Catalina. With the exception of the Lick house lot and the property in Santa Clara, Mr. Lick was rather conservative in this matter of improvements. The structure which bears his name was, however, at the period of its

erection, far in advance of the times. The property at Santa Clara he improved for his own residence, and, on a piece of land near San Jose, erected a flour-mill, on which he lavished about \$200,000, almost all the woodwork in the same being of mahogany.

After a lifetime spent in the pursuit of riches, on the 2d of June, 1874, Mr. Lick executed a deed of trust in which he divided nearly all his vast fortune for public benefactions, and appointed a board of trustees. Estimates of the estate at that time placed its value at \$5,000,000. We append a list of the donations of the last trust deed as it now stands. We omit any account of the schedule of property, and, in speaking of the gifts, summarize them from the deed:

To his son, John Henry Lick, he gave \$150,000; to John H. Lick, of Fredericksburg, Pa., \$3000; to Henry Lick, of same place (his half-brother), \$5000; to his sister, Sarah Hepler, \$5000; to his niece, \$2000; to another niece, \$2000; to his nephew, James W. Lick, of Santa Clara, \$2000; to Thos. E. Fraser, of San Jose, \$2000.

The trustees were required to expend the sum of \$700,000 for the Lick Observatory. The provisions concerning the telescope are printed in another column in this number of the PRESS.

The Society for the Prevention of Cruelty to Animals, of San Francisco, receives \$10,000,

monument to Francis Scott Key, author of the "Star Spangled Banner." This is being erected in Golden Gate Park, and will be uncovered on the 4th of July next.

The sum of \$100,000 is to be expended in a group of bronzes statuary at the City Hall, San Francisco, which shall represent by appropriate designs and figures the history of California; first, from the early settlement of the Missions to the acquisition of California by the United States; second, from such acquisition by the United States to the time when agriculture became the leading interest of the State; third, from the last named period to the 1st of January, 1874.

The trustees are to found and endow, at a cost of \$540,000, an institution to be called "the California School of Mechanical Arts," the object and purpose of which shall be to educate males and females in the practical arts of life, such as working in wood, iron and stone, or any of the metals, and in whatever industry intelligent mechanical skill now is or can hereafter be applied; such institution to be open to all youths born in California. The institution shall be founded and endowed under the direction of said Dr. J. D. B. Stillman, Horace Davis, A. S. Hallidie, John Oscar Eldridge, John O. Earl and Hon. Lorenzo Sawyer, and the survivors of them.

After making these payments, the residue



JAMES LICK—THE FOUNDER OF THE OBSERVATORY.

with a hope that similar societies will be organized in other towns of California.

The Protestant orphan asylum, of San Francisco receives \$25,000.

The sum of \$25,000 is given to the city of San Jose to erect a free orphan asylum, without regard to creed or religion of parents.

The Ladies' Protection and Relief Society, of San Francisco, receives \$25,000.

The Mechanics' Institute, of San Francisco, receives \$10,000 for the purchase of scientific and mechanical works.

The sum of \$5000 has been expended in a monument to his mother, Sarah Lick; \$5000 for a monument to his father; \$5000 for a monument to his grandfather, William Lick, who died near Morristown, Pennsylvania, at the age of 104 years, to commemorate the services rendered by him in the American struggle for independence, and the hardships he suffered at Valley Forge and other places during the struggle; all of said monuments were erected at Fredericksburg; and the further sum of \$5000 in the erection of a granite monument to the memory of his sister Catherine, at her burial place, Pennsylvania.

Out of the proceeds of the estate the sum of \$100,000 is set aside to found an institution to be called the "Old Ladies' Home," as a retreat for women who are unable to support themselves and who have no means of their own. The trustees of this are A. B. Forbes, J. B. Roberts, Ira P. Runkin, Robert McEroy, and Henry M. Newhall.

The sum of \$150,000 is to be expended for free baths in the city of San Francisco. H. M. Newhall, Ira P. Runkin, J. D. B. Stillman, and John O. Earl are the trustees.

The sum of \$60,000 has been expended for a

and proceeds of the estate is to be conveyed in equal portions to the California Academy of Sciences and the Society of California Pioneers, to be expended in the purchase of a library holding natural specimens, chemical and philosophical apparatus, rare and curious things useful in the advancement of science, and generally in carrying out the objects of the societies.

Mr. Lick reserved to himself his homestead in San Jose, during his life, but on his death it went to the Pioneers and Academy of Sciences. He had previously given to these societies each a lot 80x275, on Market and Fourth streets, the lots being valued at about \$200,000 each. These lots are aside from the deed of trust, and the societies have possession, the Pioneers having put up a fine building on their property.

It is now known that had the property of James Lick been sold soon after his death, at a time of real estate depression in this State, it would have barely realized sufficient to carry out his plans, leaving little for the Pioneers and Academy of Sciences. Now, however, the real estate has advanced materially and those two organizations expect to realize \$300,000 to \$400,000 each as residuary legatees after all the bequests are fulfilled. The Lick Trustees have been receiving a steady income from the real estate and bonds since the donor's death, and a handsome sum has accumulated.

The largest single sum left by Mr. Lick was that intended for the observatory, which is as completely described in this number of the PRESS. This observatory fittingly forms his monument. According to an arrangement made before Mr. Lick's death, Mt. Hamilton was selected as the permanent resting-place for his remains. This was not by his direction, and it must not be thought that he had any vain idea

of securing a lasting monument for himself in his establishment of the observatory. It was thought fitting by his friends that his tomb should be the solid pier of masonry upon which rests the magnificent telescope which he has given to the people of this State—the greatest telescope that the world has thus far seen. In January, 1887, the remains of Mr. Lick were removed from San Francisco to Mt. Hamilton and are now safely inclosed as was planned years ago. The final burial was conducted with simple ceremonies, as will be described.

The remains were taken from San Francisco to San Jose by rail on Saturday, January 8, 1887, with an escort of gentlemen representing the various institutions which have been intrusted with the management of Mr. Lick's benefactions. San Jose was reached at 11 A. M., a procession of citizens of San Jose followed the remains to the borders of the city, and thence to the mountain the body was accompanied by those who went from this city and by the Mayor of San Jose. The mountain-top was reached at about 5 o'clock P. M., and the party proceeded at once to the rotunda, where the casket was opened and the remains identified by Capt. Fraser and others. They then proceeded to the library, where Prof. George Davidson read the memorial document of identification as follows:

This is the body of JAMES LICK, who was born in Fredericksburg, Penn., August 25, 1796, and who died in San Francisco, Cal., October 1, 1876.

It has been identified by us and in our presence has been sealed up and deposited in this foundation pier of the great equatorial telescope this ninth day of January, 1887.

In the year 1875 he executed a deed of trust of his entire estate, by which he provided for the comfort and culture of the citizens of California, for the advancement of Handcraft and Redecraft among the youth of San Francisco and of the State; for the development of scientific research and the diffusion of knowledge among men, and for founding in the State of California an astronomical observatory to surpass all others existing in the world at this epoch.

This observatory has been erected by the trustees of his estate, and has been named the Lick Astronomical Department of the University of California, in memory of the founder.

This refracting telescope is the largest which has ever been constructed, and the astronomers who have tested it declare that its performance surpasses that of all other telescopes.

The two disks of glass for the objective were cast by Ch. Fell of France, and were brought to a true figure by Alvan Clark & Sons of Massachusetts.

Their diameter is 36 inches and their focal length is 56 feet 2 inches.

Upon the completion of this structure, the Regents of the University of California became the trustees of this Astronomical Observatory.

The board of trustees of the Lick estate:

RICHARD S. FLOYD, President.  
E. B. MASTICK,  
CHAS. M. PLUM,  
GEORGE SCHONEWALD.

The President of the Board of Regents of the University of California and Governor of the State of California.  
WASHINGTON BARTLETT,  
(by J. W. Winans.)

The President of the University of California and Director of the Observatory.  
EDWARD SINGLETON HOLDEN.

The President of the California Academy of Sciences and of the council thereof.  
GEORGE DAVIDSON.

The President of the board of trustees of the California Academy of Sciences.  
GEORGE E. GRAY.

The President of the Society of California Pioneers.  
GUSTAVE REIS.

A director and ex-President of the Society of California Pioneers.  
PETER DEAN.

The Mayor of the City of San Jose.  
C. W. BREYFOGLE.

The preparation of the above document was assigned to Prof. Geo. Davidson. It was approved and then engrossed in handsome style with India ink on fine parchment.

After the signatures given above were affixed the document of identification was inclosed between two finely tanned skins, hacked by black silk and soldered in a leaden box 18 inches long and of the same width, and one inch in thickness. It was placed upon the iron casket, after which the lining of the oak casket was soldered up air-tight and the oak lid screwed down. The casket was then draped with an American flag and left in charge of a watchman until the following morning.

On Sunday morning at 11 o'clock the gentlemen who had escorted the body to Mt. Hamilton ascended the gang-plank leading to the foundation-stone, and, arranging themselves around the vault, now containing the casket, with uncovered heads, were addressed by the president of the Lick trustees, Captain R. S. Floyd, in the following words:

"Gentlemen: We are here to place the remains of James Lick in their final resting-place beneath this stone foundation of the pier upon which will be mounted the great telescope that he has given to California and the world of science."

"Mr. Lick left no positive instructions as to the disposition of his remains. The idea of making this place a tomb for his body did not enter the motive of his magnificent bequest which has created this great work. The idea was suggested to him long after he made his trust deed, and it met with his approval."

"The trustees have concluded, with the approbation of his son, John H. Lick, now in Pennsylvania, to place his remains in this pier, believing that the most powerful telescope so far made in the world will make his most appropriate monument, and this commanding site overlooking his California home his most fitting resting-place."

At the conclusion of the president's remarks,



workmen placed strong iron bars upon the abutments of the vault, upon which was placed heavy iron sheeting. The vault was then built with brick and mortar to the level of the foundation-stone.

A great stone weighing 2½ tons was then swung, being already suspended for the purpose, and let slowly down upon the brickwork, beneath which was the casket. Three other stones of the same weight were then placed in position, when the four were bolted by suitable bolts, running down to the foundation five feet. On top of the stones has since been set the first section of the iron pier of the great telescope. The heavy pier itself has been completed, and the telescope mounted in position.

### The Trip to Mt. Hamilton.

#### A Magnificent Mountain Stage Ride.

The road from San Jose to Mt. Hamilton was built at the expense of the county of Santa Clara and cost about \$90,000. No more magnificent mountain road exists in the United States when all the circumstances of line scenery, excellent road-bed and extensive and commanding views are considered. The road rises 4000 feet in 22 miles, and the grade nowhere exceeds 6½ feet in 100, or 343 feet to the mile. Most of the road is materially less steep than this. The first four miles (of the 20) is a fine nearly level avenue, laid out in perfectly straight lines, in the Santa Clara valley. The ascent of the foothill is then commenced, and the road begins a series of twistings and turnings which are necessary in order to keep the gradient low. Toward the end of the route the road winds round and round the flanks of the mountain itself and overlooks one of the most picturesque of scenes. The lovely valley of Santa Clara and the Santa Cruz mountains 2000 to 3000 feet to the west, a bit of the Pacific and the Bay of Monterey to the southwest, the Sierra Nevada (13000 to 14,000 feet) with countless ranges between to the southeast, the San Joaquin valley with the Sierras beyond to the east, while to the north lie many lower ranges of hills, and on the horizon Mount Shasta or Lassen's Butte (14,350 feet) 175 miles away. The Bay of San Francisco lies flat before you, like a child's dissecting map, and beyond it is Mt. Tamalpais (2587 feet) at the entrance to the Golden Gate. Monte Diablo (3843 feet) lies to the northeast, 41 miles distant. Mt. St. Helena (4343 feet) is not visible. Mt. Hamilton thus dominates all its neighbors and holds a singularly isolated place.

The City of San Jose, the nearest point of railroad communication from Mt. Hamilton is 50 miles south of San Francisco. Mt. Hamilton by the highway is 26 miles from San Jose, nearly east. The distance between the Observatory and San Jose in an air line is only 13 miles.

The approximate geographical position of the Observatory peak is: Longitude, 2 hours, 58 minutes, 22.2 seconds (Washington). Latitude, 37° 20' 25". The elevation of this point is 4210 feet above the level of the sea. The north peak, which is about three fourths of a mile distant, is 146 feet higher. The ridge between is lower, along which is a good trail connecting the two peaks. The sides of the mountain in most directions are very steep, and form an acute angle at the summit. The view from the peak is unobstructed in every direction, there being no higher ground within a radius of 100 miles.

At sunset the Pacific ocean is seen over the summit of the Coast Range at various points; and occasionally a snow-covered mountain is seen in a northerly direction. The great range of the Sierra Nevada, about 130 miles distant, comes out sharp and distinct at sunrise.

On the mountain there is but little to be feared from the ocean fogs, as they seldom reach this elevation. Very frequently commencing at or soon after sunset, this fog comes in from the Pacific at the Golden Gate on the north and the Bay of Monterey on the south, and covers the whole valley between the base of Mt. Hamilton and the Coast Range with a dense mass of vapor, resembling, when seen from above, a great white sea, the tops of the lower hills standing up through it like islands. Ordinarily it is perhaps 2000 feet lower than the summit of Mt. Hamilton.

Ever since the smaller telescope was put in position on the mountain, the place has attracted sight-seers. As the observatory approached completion, and the instruments were placed, the desire to see the largest telescope in the world has greatly increased the number of visitors. Tourists who come to California look forward to seeing the Lick telescope as much as they do to seeing the Yosemite valley. Tourists can go to the mountain and return to San Jose the same day, and very shortly arrangements will be made so that every Saturday night, from 7 to 10 o'clock, will be set apart for visitors.

The Regents of the University intend shortly permitting the Mt. Hamilton Stage Co. to erect a suitable "public house" a short distance from the summit of the mountain, and plans are now being prepared. It will be an artistic-looking building, capable of accommodating from 150 to 200 persons. There will then be accommodation for visitors who desire to remain on the mountain on each night as the observatory is open to the public. At present the nearest hotel is at Smith creek, some miles distant.

The exceptional excellence of the stage accommodations has much to do with the increase in number of visitors to the mountain. The Mount Hamilton Stage Company, of which F.

S. Chadbourne of this city is president, has a number of fine well built coaches made especially for this route. The coaches are the best that could be procured, and are handsome, roomy and comfortable. Exceptionally skillful

Francisco. The road is so well built and the stage equipment so exceptionally good that the old idea of a "stage ride" is done away with, and the trip to the mountain is really a pleasure drive. The luxuries of modern travel on



ON THE WAY TO MT. HAMILTON.

drivers have been employed. Horses are changed frequently so that rapid time is made. The stage line is sufficiently equipped to carry 100 passengers a day to and from the mountain. Each coach carries 11 persons.

The coaches of the Mt. Hamilton Stage Co. connect at San Jose with the trains from San

Pullman cars are paralleled on this stage line. The horses are carefully selected and the drivers are uniformed and required to be polite and attentive to patrons. People can enjoy a mountain drive without fear of danger. The stage company intend sprinkling the road during the summer months, so that the trip

will be free from dust. Not only is the view from the mountain exceptionally grand, but the scenery along the route is alone well worth the trip. The cuts on this page were made from photographs taken some months since. On page 417 is an engraving of one of the elegant new style coaches now in use by the company.

The St. James hotel at San Jose has been selected as the headquarters of the Mount Hamilton Stage Co. This, the leading hotel in San Jose, is excellent in its appointments and arrangements. It has recently been freed and refitted peculiarly with a view to the accommodation of visitors to Mt. Hamilton. Many interesting landscape paintings of a local nature may be seen at this hotel.

### Stellar Photography at Mt. Hamilton.

In 1887 the International Congress of Astronomers met at Paris and considered a scheme of international co-operation in the work of making a complete photographic map of the heavens from the north to the south pole. A plan was perfected by which a number of observatories by similar methods can obtain a series of negatives, which, taken together, will constitute a picture of the whole sky. The chief object of the deliberations was the determination of the means of making a complete survey of the whole heavens, by means of photography; and they also discussed the best methods of securing photographs of nebulae, comets, star clusters, binary stars, planets, etc. Their conclusions were formulated in resolutions, one of which reads thus: "To make a photographic chart of the sky for the present epoch, and to obtain the data for determining the position and magnitude of all the stars to the 14th magnitude." The work is of such paramount importance that, so far as possible, the Lick Observatory will join in it.

In the *Overland Monthly* for June Prof. E. S. Holden contributes an article on "Stellar Photography," in which he says:

"The whole question of making charts by photography is so recent that the Lick Trustees did not include in their plan, by my advice, the purchase of one of the 13 inch photographic telescopes recommended by the Paris conference in April, 1887. To have done so would have involved postponing the transfer of the Lick Observatory to the Regents of the University (and hence postponing the beginning of its active work) for many months, and perhaps for several years.

"Still, it is now known that this important work will be begun, and it is quite possible for the Lick Observatory to take a very active part in it, provided the necessary instruments are available, and an extra observer is forthcoming.

"If any friend of astronomy will give us \$20,000 for this purpose, I can promise for the Observatory that it will engage in this international undertaking with vigor. And I think that it is quite safe to promise that our work will be done as well as any other. I am sure that we shall be able to finish our task more quickly than other observatories, owing to the continuous clear weather of our summer and fall months.

"But the Lick trustees acting on my advice have provided a photographic attachment to the 36-inch telescope, which will enable this to be used as a gigantic camera for photography.

"It cannot be used to make maps according to the scheme of the Paris Congress, since that scheme requires a focal length of 13 feet, while ours will be 47. But we shall have a vast deal of work to be done falling under the resolution of the congress quoted.

"I have so far said nothing of the photography of the moon, of the planets, of nebulae and comets. Here the Lick telescope will have some important advantages. But it is in the photography of stars—of double and binary stars, of all the fainter stars, of all star clusters—that the Lick photographic telescope will find its chief application and demonstrate its immense superiority."

**APPARATUS FOR EXAMINING ORES.**—An apparatus for examining rocks, to determine whether they contain metallic ores, has been patented by Messrs. John R. Williamson of Seattle, Washington Territory, and Wm. W. Hickie of Oakland, California. One pole of a battery is connected with one terminal of a telephone receiver by means of a wire in the usual way, the remaining pole of the battery being connected by a conductor with a brush provided with a suitable handle, while the remaining terminal of the telephone receiver is connected by a conductor with a similar brush having a like handle. In examining rocks in place, the two brushes forming the terminals of the conductors connected with the telephone and battery are drawn along the face of the rock, while the telephone is held to the ear of operator. If the rocks contain metals they conduct the current, and the movement of the brushes along the rough face of the rock causes variations therein, which are audible through the telephone, there being no sounds produced when the rock contains no minerals. In examining detached portions of rock, the latter are placed upon a conducting plate connected with the telephone through the battery, and the brush at the other terminal is touched to the rock, which, if it contains metal or metallic ores, will cause sounds to be heard in the telephone. Instead of using the conducting plate, the fragments of rock may be examined by being placed upon insulating material, and bringing both brushes in contact with each specimen. —*Scientific American*.



## About Obtaining Patents.

### Patents are Virtually Contracts.

The Patent Law provides that in case a patent, which is the evidence of the contract, is not executed in compliance with the requirements of the law, it may be annulled and rendered void. Hence, it is of the greatest importance to every inventor that his patent or contract be skillfully and accurately drafted, in order that it may afford him complete protection for his invention during the life of his patent.

### Secure a Good Patent.

An inventor should first ascertain whether or not his invention has been patented to another. This requires an exhaustive search among all the patents in the class to which the invention relates. If, by this "preliminary examination," the improvement is found to have been previously patented, our client will receive, for the small sum of \$5 for the examination, a verbal or written report showing definitely wherein his invention has been anticipated, thereby saving him further expense and perhaps much time, anxiety, etc.

To avoid all needless delay, however, and secure patents at the earliest moment practicable, inventors will do well to forward a model, drawing or sketch, with a plain, full and comprehensive description of their invention (stating distinctly what the particular points of improvement are), with \$15 as a first installment of fees. If the improvement appears to us to be novel and patentable, the necessary papers for an application for a patent will be prepared immediately and forwarded to the inventor for his signature. When he receives the application and finds it duly prepared, he will carefully sign and return the same plainly addressed to us, with postal money order or express receipt for our own fee. The case will then be promptly filed by us in the Patent Office, and vigorously prosecuted to secure the best patent possible. [This course is the most expeditious and satisfactory, as no time is lost in transmitting correspondence relative to the preliminary steps.] When the patent is allowed the inventor will be duly notified, and on sending the final Government fee of \$20 to us, we will order the issue of the patent, and forward the same as soon as it is secured from the Patent Office.

The payments are thus divided and made easy. We make no pretense of doing cheap work, in order to entice custom, nor do we afterward make additional charges to bring the bill up to a fair compensation. We do our work honestly and thoroughly, and we never give up a case so long as there is a chance of obtaining a patent. The Agency charge, including drawings, rarely exceeds \$40, and for this we do not feel we can without appealing the case.

### Models and Drawings.

Models are now seldom required by the Commissioner of Patents, and generally only in intricate cases. Perfect drawings of practical working machines are more satisfactory to the Patent Office than the old cumbersome system of storing up an immense bulk of countless models.

Drawings or sketches, sufficient to illustrate the invention clearly, with a description that will enable us to make a full set of perfect drawings for the Patent Office, is all that we require. A model will answer our purpose as well, however, in cases where the inventor can more easily furnish it.

The value and even the validity of a patent often depends on the character, clearness and sufficiency of its drawings. There are thousands of existing patents in which the improvements are but partially or poorly illustrated in the drawings. When an attempt is made to dispose of such patents, the vagueness and defects of the drawings often prejudice capitalists and manufacturers against the invention, while in reality it may be of great value, and would meet with ready sale had it been skillfully, completely and artistically portrayed. In all cases prepared by us, the drawings are made under our personal supervision, by skilled draftsmen in our constant employ, and every precaution is taken to have the invention fully and clearly shown by different views, so that the improvement will be readily understood by the Examiners in the Patent Office, and comprehended by the public when the patent is granted.

### Advantages to Inventors on the Pacific Coast.

The firm of DEWEY & Co. has edited and published the MINING AND SCIENTIFIC PRESS continuously since 1860, a period of 28 years. Few agents, who are still engaged in the business, have had so long-extended practice in patent soliciting. The members of the firm give personal attention to the applications intrusted to their care; and their familiarity with inventions and with local affairs in the Pacific States and Territories, enables them to understand the wants of inventors on this coast more readily and thoroughly, as we believe, than any other agents in America. Thus there is saved a great deal of the time which ordinarily—when distant agents are employed—is wasted in preliminary writing back and forth.

This happy combination of long business experience together, and wide connections, has placed our firm in a position unquestionably most fortunate for affording inventors prompt and reliable advice, and the best facilities for securing their full patent rights with safety and dispatch at uniformly reasonable rates.

Every patentee of a worthy invention is guaranteed the gratuitous publication of a clearly-stated and correct description of his invention, in one or more of our influential and reliable newspapers, affording just the circulation best calculated to widely inform the class of readers especially interested in the subject of his invention.

### Caveats.

A caveat is a confidential communication made to the Patent Office, and is therefore filed within its secret archives. The privilege secured under a caveat is, that it entitles the inventor to receive notice, for a period of one year, of any application for a patent subsequently filed, which is adjudged to be novel and is likely to interfere with the invention described in the caveat, and the inventor is then required to complete his application for a patent within three months from the date of said notice. Caveat papers should be very carefully prepared. Our fee for the service varies from \$10 to \$20. The Government fee is \$10 additional. To enable us to prepare caveat papers, we require only a sketch and description of the invention.

### Rejected Applications.

Inventors who have rejected cases (prepared either by themselves or for them by other agents) and desire to ascertain their prospects of success by further efforts, are invited to avail themselves of our unrivaled facilities for securing favorable results. We have been successful in securing Letters Patent in many previously abandoned cases. Our terms are always reasonable.

Inventors doing business with us will be notified of the state of their application in the Patent Office whenever it is possible for us to furnish such information.

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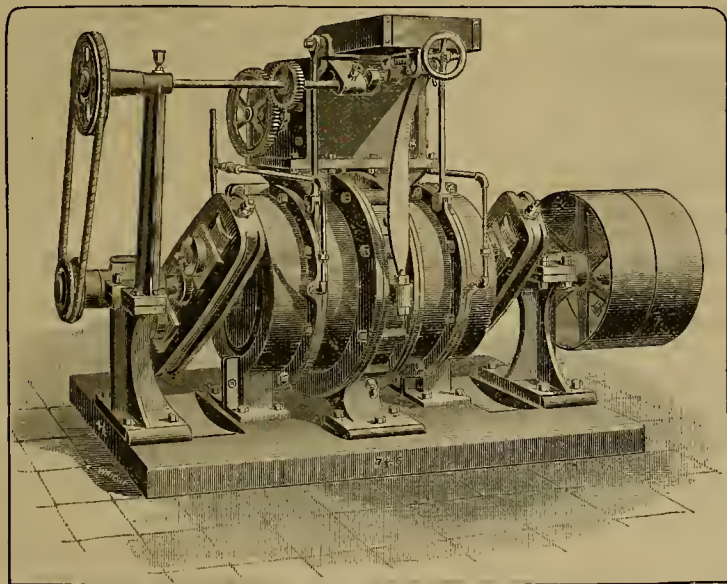
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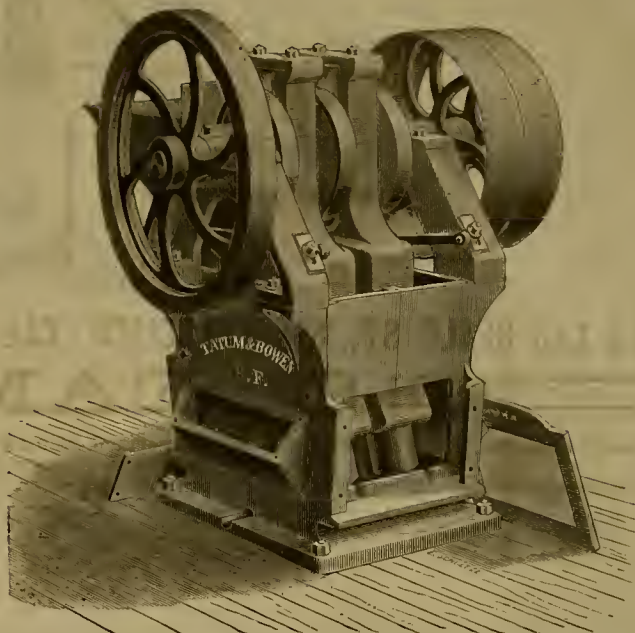
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Goes with each Mill. We also have a suitable

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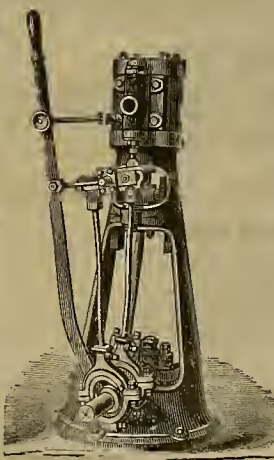
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**DELINQUENT NOTICE.**

**Butte Creek Hydraulic Mining Company.**  
Location of principal place of business, 213 Market St., San Francisco, Cal. Location of works, Butte county, California.

NOTICE—There are delinquent, upon the following described stock, on account of Assessment No. 12, levied on the 27th day of March, 1888, the several amounts set opposite the names of the respective Shareholders, as follows:

Names.	No. Certificates.	No. Shares.	Amount.
J. D. Dexter, Tr.....	46	100	5 00
J. D. Dexter, Tr.....	43	100	5 00
J. D. Dexter, Tr.....	49	100	5 00
J. D. Dexter, Tr.....	63	500	25 00
Ed. Dexter, Tr.....	80	500	\$ 25 00
Cbas. Moss.....	92	500	25 00
B. Frank Moss.....	96	500	25 00

And in accordance with law, and an order of the Board of Directors, made on the 27th day of March, 1888, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Market street, San Francisco, Cal., on Monday, the 25th day of May, 1888, at the hour of 1 o'clock p. m., of said day, to pay Delinquent Assessments thereon, together with costs of advertising and expenses of the sale.

LOUIS R. LEVY, Secretary.  
OFFICE—213 Market St., San Francisco, Cal.

**POSTPONEMENT.**

The above sale day is hereby postponed to MONDAY, June 11, 1888, at the same hour and place. By order of the Board of Directors. LOUIS R. LEVY, Secy.

**MEETING NOTICE.**

**Office of the Alabama Mining Company.**  
Corner of Fifth and Stevens streets, San Francisco, California, May 12, 1888. Location of works, near Newcastle, Placer county, California.

NOTICE is hereby given to all the Stockholders of said Alabama Mining Company (a corporation) that there will be a general meeting of the Stockholders of said company held at the office of said company at the S. W. corner of Fifth and Stevenson streets, in the city of San Francisco, Cal., on Monday, the 11th day of June, A. D. 1888, at the hour of 1 o'clock p. m. of said day, for the purpose of removing from office the following named Directors of said company, to wit: Owen King, William Reinhold, Samuel Jones and Michael Hoffman, and for the further purpose of filling by election then and there the vacancies that may be caused in the Board of Directors by such removals.

The undersigned is the owner of more than two-thirds of the capital stock of said corporation, as well as a Director and President of said company, and makes this call under the provisions of Section 310 of the Civil Code.  
J. J. SMITH,  
President of the Alabama Mining Company.

**California Inventors**

Should consult DEWEY & CO. AMERICAN AND FOREIGN PATENT SOLICITORS, for obtaining Patents and Caveats. Established in 1860. Their long experience as journalists and large practice as Patent attorneys enables them to offer Pacific Coast Inventors far better service than they can obtain elsewhere. Send for free circulars of information. Office of the MINING AND SCIENTIFIC PRESS and PACIFIC RURAL PRESS, No. 220 Market St., San Francisco Elevator, 12 Front St.

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This new and important book is on the use and construction of Ditches, Flumes, Dams, Pipes, Flow of Water on Heavy Grades, methods of mining shallow and deep places, history and development of mines, records of gold washing, mechanical appliances, such as nozzles, hurdy-gurdys, rockers, undercurrents, etc.; also describes methods of blasting; tunnels and sluices; tailings and dump; duty of miners' inch, etc. A very practical work for gold miners and users of water. Price, \$5, post-paid. For sale by DEWEY & Co., Publishers, 252 Market St., San Francisco.

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This new work is written by an experienced metallurgist who has devoted many years to assaying and working precious ores on the Pacific side of the American Continent. He writes whereof he knows from personal practice, and in such plain and comprehensive terms that neither the scientist nor the practical miner can mistake his meaning.

The work, like Mr. Aaron's former publications ("Testing and Working Silver Ores," "Leaching Gold and Silver Ores") that have been "successfully popular" is written in a condensed form, which renders his information more readily available than that of more wordy and less conscientious writers. The want of such a work has long been felt. It will be very desirable in the hands of many.

**Table of Contents:**

Preface; Introduction; Implements; Assay Balance; Materials; The Assay Office; Preparation of the Ore; Weighing the Charge; Mixing and Charging; Assay Litharge; Systems of the Crucible Assay; Preliminary Assay; Dressing the Crucible Assays; Examples of Dressing; The Melting in Crucibles; Scorchification; Cupellation; Weighing the Bead; Parting; Calculating the Assay; Assay of Ore Containing Coarse Metal; Assay of Roasted Ore for Solubility; To Assay a Cupel; Assay by Amalgamation; To Find the Value of a Specimen; Tests for Ores; A Few Special Minerals; Solubility of Metals; Substitutes and Expedients; Assay Tables.

The volume embraces 106 12mo. pages, with illustrations, well bound in cloth; 1884. Price, \$1, postpaid. Sold by DEWEY & Co., Publishers, No. 252 Market street, San Francisco.

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**Lead, Copper, Tin, Mercury, etc.**  
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This book is entitled "Assaying—Parts II and III," and is separate from Part I, and treats of Gold and Silver Bullion, Lead, Copper, Tin, Mercury, Zinc, Nickel, Cobalt, etc.

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Gold and Silver Bullion; Apparatus; Melting Bullion, Assaying Bullion; Humid Assay of Silver; Manipulation, etc.; Lead Ores; Copper Ores; Volumetric Assay; Parkes' Process; Amalgamation; New Process; Preparation of Potassium Zanthate; Electrolytic Determination of Copper in Ores, etc.; Assaying of Tin Ores; Assaying of Mercury Ores; Assaying of Zinc Ores; Assaying of Zinc Ores, New Method; New Assay of Nickel and Cobalt; Assay of Chromium; Assay of Bismuth; Assay of Arsenic; Assay of Antimony; Assay of Sulphur; Assay of Salt; Appendix to Part I; Notes on Crucible Assays; Weighing by Oscillations; Appendix to Part III; The Assay of Lead; The Assay of Copper.

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Special attention given to management and sales of mines and purchase and shipment of copper products



## Foreign Capital in Mexican Mines.

The benefits of railways are in no country more apparent than in Mexico. The advances that have been made in that country during the past four years would make the old ones turn over in their graves could they realize it. The agricultural and commercial interests have reaped a vast benefit; the mining interests have been given a new lease of life, and we might say that the present stable state of the Government is, in a great measure, due to the advanced civilization which always follows the building of railroads in sparsely settled districts.

The principal railroad of the country, the Mexican Central, was built by American capital. It passes through a mineral country from El Paso on the north to the city of Mexico on the south, and, as a natural consequence, American capital is now largely being advanced for the purpose of developing the known mineral wealth.

The improved methods of working ores, which are rapidly supplanting the old methods, such as working lead ores with the Serpentine and silver ores by the Patio method, are making dividend-paying mines of properties which for years have been idle, as the expense of production was in many cases greater than the hullion output.

That country tributary to the Vera Cruz line, which runs from the City of Mexico to Vera Cruz on the Gulf of Mexico, has for a number of years enjoyed the benefits of English machinery for mining and milling purposes, but even here it has been found remunerative to supplant existing machinery with the more improved as it is manufactured in the United States. At the present time a plant, manufactured in San Francisco, is being erected in Pachoa, to work the tailings of the Santa Gertrudis Hacienda. The original plant of this Hacienda was brought from England and considered one of the finest in that part of the country. One of the richest and most prosperous mines in the State of Zacatecas, the Candelaria de Pinos, is, or soon will be, once more in bonanza, when the pumping machinery, introduced by a New York syndicate, is in full operation.

The properties in the State of Chihuahua, known as the Batopilas, under the management of "Boss" Shepperd, is among the largest, if not the largest, mining corporation in the world. The success of this company is due, aside from good management, to the improved American machinery with which the property is equipped. On the west coast of Mexico, American companies are rapidly absorbing all the better properties. Hardly a Pacific Mail steamer leaves this port that has not, as part of its cargo, machinery for Mexico.

The Mexican Government has seen the benefit of foreign capital in developing its mineral resources; they are constantly legislating for its benefit, though it is true that in some States the local Government still believe that a foreigner should be *cinched*, and it is but a question of a short time when mining will be as free of taxation in that country as in this.

**MINING ACCIDENT.**—On Saturday morning last, in the Consolidated Virginia shaft, Nev., a bad accident occurred. Three men were taking some timbers from the 1400 level to the 1300 station on the double decked cage. In ascending the shaft one of the timbers (12x14 inches in size) in some way slipped from the grasp of Drysdale and swung out so far that the top of it caught under a wall-plate. This brought the cage to a halt with a great jar and threw it off the guides. The sudden stopping of the cage threw Hanna off it. In falling, his feet caught between the edge of the cage and one of the wall-plates of the shaft, where he hung suspended, head downward. Drysdale was jammed between the timbers and the side of the shaft, and fell to the floor of the cage. Fitzgerald was not injured, though a good deal shaken up. It was nearly half an hour before the rescue party could reach the cage, and all this time John Hanna was hanging head downward. Drysdale was, however, much the worse hurt and may probably die.

The Coroner's jury in the case of Jim Harrington, the miner killed in a cave in the St. Lawrence mine, at Butte, M. T., found that the cave was unavoidable and could not have been foreseen, and exonerated the management from blame.

## The Advisers and Constructors.

Captain R. S. Floyd, President of the Lick Trustees, has taken the most earnest interest in the building of this observatory. He has worked early and late to perfect the arrangements. To his intelligent action in the various steps taken much of the success is due. Thomas E. Fraser, the superintendent of construction, was formerly Mr. Lick's confidential agent. To his unceasing care and ready comprehension, the Lick Trustees state, the excellences of the observatory is due in no slight degree. The Board of Trustees seconded heartily all efforts to accomplish the object as Mr. Lick would have desired.

Many astronomers interested themselves in the work and showed by personal visits or correspondence their appreciation of the importance of the undertaking. Among them were the late Dr. Henry Draper of New York; the late U. J. Le Verrier, director of the Paris Observatory; Dr. Wm. Huggins of London; Dr. David Gill, H. M. Astronomer at Cape of Good Hope; Dr. Johann Palisa of Vienna; Prof. Krueger of Kiel; Prof. Auwers of Berlin; Prof. Langley of Alleghany; Prof. Young of Princeton; Prof. Harkness of Washington; Prof. Hastings of New Haven; Prof. Ewing of Dundee. The chief astronomical advisers were Prof. Newcomb and Prof. E. S. Holden.

The glass disk for the great lens was made by Charles Feil of Paris. Alvan Clark & Sons were the makers of the lens for the 36-inch objective, and did other important work mentioned in the text of the descriptive article in this number of the PRESS. The mounting of the instrument was made by Messrs. Warner & Swasey of Cleveland, Ohio. The Clarks made the micrometer, the 12-inch and 6½-inch equatorials, the objectives belonging to the meridian circle and the collimator, the comet-seeker and the photo-heliograph. The meridian circle was made by Messrs. Repsold. The spectroscope was made by J. A. Brashear of Alleghany.

The four-inch transit and zenith telescope combined were made by Fath & Co. (objective by Clark & Son). The universal instrument is by Repsold. There are two clocks by Howden, one by Dent, one by Frodsham and one by Howard. Chronometers are by Negue & Co. The thermometric chronometer is by Frodsham & Co. Three chronographs are by the Messrs. Bond, one by Fath & Co., and one by Warner & Swasey. The electric switch-board was made by Royce & Mearns of Washington. The measuring engine was made by Stackpole & Bro., New York. The level-trier by Repsold & Sons, and spherometer by Fath & Co.

The mercurial barometers are by John Roach of this city, and H. T. Green of New York. The thermometers by Green of New York, and Roach of San Francisco. The rain and snow gauge and the self-registering barometer are Draper's. F. H. McConnell of this city, a skilled horologist, will attend to repairs, etc., on the clocks at the Observatory.

In putting up the buildings most of the work was done by day's work under supervision of the Lick trustees, and immediate supervision of Thos. E. Fraser, superintendent of construction. There were, therefore, few contracts let. The observatory house was, however, built under contract by James Treadwell of San Francisco.

The great dome was made under contract by the Union Iron Works of this city. They also made the hydraulic rams for raising the floor. The bricks for the building were made on the spot by T. W. Peterson & Co. of San Jose. The sand was brought from Smith Creek. For order of San Francisco put the metal roof on the building. Small individual contracts were made for portions of the work, but it was mainly done under order of the trustees.

THE receipts of coal at this port last week were 3050 tons coast and 2660 tons foreign, which is very light. However, there is a vast quantity of Australian coal loading for and on the way to this port. This impending influx of coal from Australia is leading importers to shade prices so as to keep their yards reasonably clear for the next four months.

LIEUTENANT BRITTON DAVIS, manager for the Corralito Company in Mexico, from which it was reported that 400,000 acres of land had been purchased for a Mormon colony, declares that the company has sold no land and intends to sell none.

## The Famous Telescope Makers.

The completion of the great 36-inch lens of the Lick telescope was the crowning feat in the life of Alvan Clark of Cambridge, the famous maker of telescopic lenses. He had attained an advanced age before commencing the work on this, the largest lens ever made, and was anxious to complete it. After repeated failures the casting was delivered to him, and his skillful hands completed the work not many months before he passed away.

His son and partner, Alvan G. Clark, who assisted him in his work, and continues his business, visited Mount Hamilton last January. He was greatly pleased with the clearness of the atmosphere there, and the facility offered for astronomical research. He has visited most of the noted observatories, and is of the opinion that this possesses advantages which no other has—the largest telescopes and the clearest atmosphere. He is confident that with the very efficient corps of observers and complete outfit of instruments, the Lick Observatory will bring fame to California. In conversation with him shortly after his visit to the mountain, he stated to the editor of the PRESS that he never saw a place where there were such good nights for astronomical observation. Even from his little experience there, he is of the opinion that the location is an admirable one—wonderfully good.

At that time he said that, if finished as proposed, all the appliances would be of the very best. The atmosphere exceeds that of any place he had ever seen for observing purposes. Some of the nights there, which those familiar with the locality did not call very good, he considered first class, as compared with other places.

Mr. Clark was pleased to find so much interest in astronomical work in California. He has, he says, a desire to build a little larger telescope than the Lick. He is more certain of the advantage of large glasses than he had been. Better material can now be procured than formerly. He is of opinion that the limit of size has not yet been reached in refracting telescopes. A young Frenchman, Edward Mantoir, successor of Fiel & Mantoir, shows great skill in producing the optical glass. He has very fine appliances and an enlarged establishment for the purpose.

Another 36 inch glass could now be made much more easily than when the Lick lens was commenced. Mr. Clark thinks a 40-inch could be made as easily as the 36-inch one. He has a strong desire to "beat their own record," although he is perfectly satisfied with this lens "as far as it goes." He now has no fear of

## Meeting of the Academy of Sciences.

The academy held a very interesting session at its regular meeting on Monday evening last. The occasion was an informal reception to Prof. Frank Cushing, who has become quite famous by his explorations and researches into the habits, customs and remains of the ancient Zuni Indians. These researches have been conducted in Arizona, and have already resulted in a very large and interesting collection of remains which throw much light on the habits and customs of this remarkable people, and prove that they had reached a very great degree of skill in many of the arts more than a thousand years ago, particularly in agriculture and architecture. Extensive remains of buried cities have been brought to light, one of which covers an area of fully three miles in length by a half a mile in width, built upon the banks of what must have been a very large and extensive canal designed for both irrigation and commercial purposes.

Professor Cushing visited the academy under special instructions from his physicians not to make any special effort at a lecture; but notwithstanding such instructions he made a brief opening address, and then taking his seat, expressed his willingness to answer any questions which might be asked in regard to his explorations.

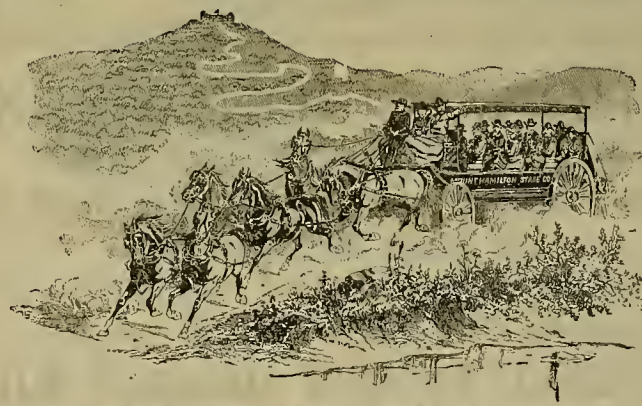
Many questions were put to him, and the large and appreciative audience present were much interested and instructed by his answers. The crowded state of our columns this week will not admit of any extended report of his remarks; but we hope to be able to give quite a full report of the same in our next issue.

The professor will probably spend some little time in this city, and it is hoped will be able to be present at the next meeting of the academy, and give still further information in regard to his explorations and discoveries. He announced that quite a number of valuable specimens were now on their way to this city to be presented to the academy.

Among the donations received for the evening were 84 birds, obtained by Walter E. Bryant in California, Oregon, Nevada and Lower California, and prepared by him, and a coyote from R. E. Rowland.

It was also announced that within a month the trustees of the academy will begin building on the Market-street lot left by James Lick. The edifice will cost about \$200,000.

MT. HAMILTON STAGES.—On this page is given an engraving of one of the coaches of the Mt. Hamilton Stage Co., running between San



COACH OF THE MT. HAMILTON STAGE COMPANY.

"flexure" in a large lens, experience having shown that fears in this direction were groundless.

SAVAGE SON & CO.—This well-known firm of foundrymen made an assignment this week. Richard Savage, when asked the cause of the failure said: "The assignment is due to the efforts made by the firm to do more business than our capital would warrant. During the last few years we have put several new irons into the fire, which have not turned out as profitably as we supposed they would. To lengthen the enterprises we borrowed large sums of money, principally from the Nevada banks, which we have been unable to repay." The firm employed about 200 men. The contracts on which they are at work will be finished, and whether they will resume again depends on the creditors. There is not much unfinished work on hand.

Jose and Mt. Hamilton, taking visitors to and from the observatory. The stages were specially built for this route and are strongly built and roomy. Those who have used them speak of the coaches as exceptionally "easy riding."

THE building of the Cogswell Polytechnic college, Twenty-sixth and Folio streets, is almost completed. The first session for the reception of students will be held on Monday, Aug. 6th.

THE Santa Paula Chronicle reports the shipment of 184 tank cars of oil from that place during the month of May, the largest shipment ever made in one month.

JOHN ROSS has resigned as superintendent of the Winnemucca Mining Co., to accept a position at the Lang Syne mine at Dun Glen.

A DESTRUCTIVE fire occurred at Kingman, A. T., on Sunday. Loss, \$50,000.



WM. H. TAYLOR, President.

R. S. MOORE, Superintendent.

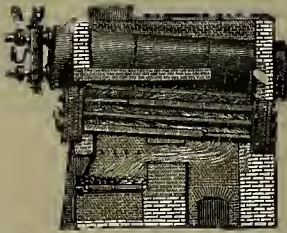
L. R. MEAD, Secretary.

# RISDON IRON & LOCOMOTIVE WORKS

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Manufacturers and Sole Agents for the Pacific Coast for

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60,000 Horse Power now in use.

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Guaranteed More Efficient than any other Boiler made.

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**AIR COMPRESSORS**—Rope Power Transmission.  
**HYDRAULIC PUMPING** and Hoisting Machinery.  
**WROUGHT-IRON WATER PIPE** a Specialty. **NOTE**—Have just completed order for 35 miles of 44-inch pipe of 4-inch iron for Spring Valley Water Works Company, San Francisco.  
**SAW-MILL MACHINERY** of all kinds.  
**STEAM ENGINES**—Corliss, Slide-Valve, Poppet Valve Automatic, Single, and Compound.  
**SOLE MANUFACTURERS** for Pacific Coast of the Celebrated "Heine" Patent Safety Boiler (Water Tube); 60,000 horse power now in use.  
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**STEAM BOILERS** of all descriptions.  
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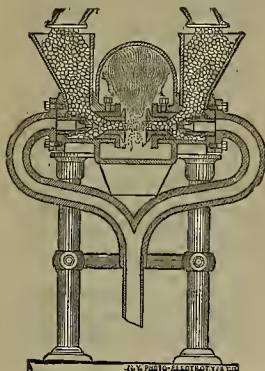
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Sectional View of Pulverizer.

## PNEUMATIC PULVERIZER.

The principle of pulverization consists in the employment of two

### POWERFUL OPPOSING CURRENTS

Of dry super-heated steam, so arranged that they continuously charge themselves with crushed or granulated material, and by the great force and velocity of the steam currents the minerals are dashed against each other with such power of concussion as to cause the hardest ores to be pulverized to any degree of fineness desired. The high temperature of the super-heated steam currents employed, through which every minute particle of ore must pass, causes them to become very hot and dry, which produces a beneficial effect upon sulphurets and ores containing rusty gold. The light weight and simplicity of construction of the pulverizer, the extremely small and inexpensive wearing parts, are the WONDER and SURPRISE of all who witness its operation. The Company is prepared to furnish complete plants for pulverizing

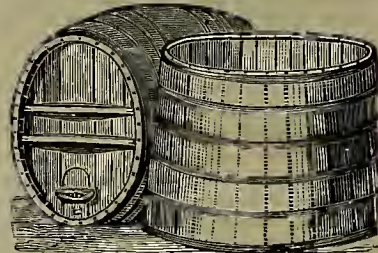
10 TO 200 TONS PER DAY,

Including a Sectional Steam Boiler supplying all the power required.

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2 and 4 Stone Street, NEW YORK.

Write for Particulars.

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**AMALGAMATING MACHINES. CASTINGS AND FORGINGS** Of Every Description

ALL WORK TESTED AND GUARANTEED.

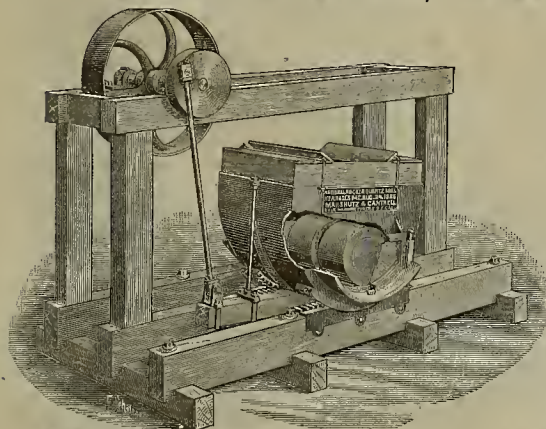
IMPROVED PORTABLE HOISTING ENGINES.

## NATIONAL ROCKER QUARTZ MILL.

KENDALL'S PATENT, AUGUST 24, 1886.

CAPACITY, 12 Tons in 24 Hours. 3 H. P.

MARSHUTZ &amp; CANTRELL, Sole Manufacturers.



The Patentee and Manufacturers cordially invite miners to critically examine and pass judgment upon this improved system of milling and amalgamating ores in the following particulars:

1. The cost is less than one-half of stamps of same capacity.
2. The freight to mine is less than one-half of stamps.
3. The cost of erecting is less than one-fourth of stamps.
4. The power to drive it is less than one-half of stamps.
5. The wear is less than one-quarter of stamps.
6. There is no wear except on shoes and dies.
7. In point of amalgamation it is superior to any other machine in use.
8. In its simplicity of construction.

We challenge competition with Stamps, Ball Pulverizers or any other ore crushing machines now before the public.

MARSHUTZ &amp; CANTRELL

Send for Circulars and Price List.

## THE RAND DRILL COMPANY,

23 PARK PLACE, NEW YORK,

Are now so situated with their new works as to offer to the miners of the Pacific Coast small Air Compressing Plants at such prices that almost any small mine can afford to put in power drills if they have none in use.

By their new and patented systems (by which the duty or performance of drills is not reduced with use) it is no longer necessary to buy a Compressor of double capacity than the drills are expected to require, in order to keep up the supply of air necessary on account of the wear of drills and compressor.

Besides having the newest and lightest designed small drill plants, the Rand Drill Company, as is well known, has built, and is now building, the largest Compressor plants in this country, and has patterns for all sizes up to 40-inch diameter of cylinder.

In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

Since the reasons which formerly restrained them from the California market no longer exist, they are now in the field for the business.

SPECIAL ATTENTION is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.

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Ores Sampled.

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Analyses of Ores, Minerals, Waters, etc.

Working Tests (practical) Made.

Plans and Specifications furnished for the  
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Special attention paid to Examinations of  
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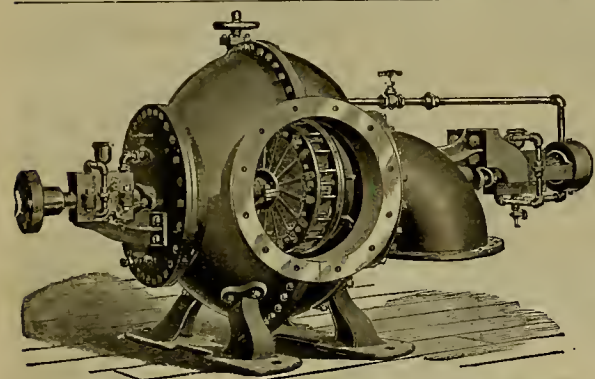
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These Wheels are designed for all purposes where limited quantities of water and  
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direct to shafting by belts, dispensing with gearing.

Estimates furnished on application for wheels specially built and adapted in  
capacity to suit any particular case.

Further information can be obtained of this form of construction, as well as the  
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For the last 14 years the H. H. H. Horse  
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among Farmers and Stockmen for the  
cure of Sprains, Bruises, Stiff Joints,  
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and for Family Use is without an equal  
for Rheumatism, Neuralgia, Aches, Pains,  
Bruises, Cuts and Sprains of all characters.  
The H. H. H. Liniment has many imitations,  
and we caution the Public to see  
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NOBEL'S EXPLOSIVE GELATINE," which contains 94 per cent of Nitro-Glycerine, and  
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FOR RAILROADS AND LAND CLEARING. Is from three to four times stronger than ordinary Blast-  
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saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

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COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed  
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey & Co.'s Patent Office Library, 220 Market St., S. F.

- FOR WEEK ENDING JUNE 12, 1888.
- 384,228.—SAWMILL DOG—M. J. Anderson, Wapinitia, Ogn.
- 384,273.—BUTTON—Anderson & Patison, San Luis Obispo, Cal.
- 384,500.—SAW-HANDLE—J. Beaulieu, Arcati, Cal.
- 384,417.—LIFTING-JACK—W. N. Best, Los Angeles, Cal.
- 384,420.—SAMPLING APPARATUS—Allen Bradford, Wardner, I. T.
- 384,425.—FAKE REGISTER—H. R. Coffey, Stockton, Cal.
- 384,524.—HYDRO-CARBON BURNER—A. Heberer, Alameda, Cal.
- 384,444.—CHALK LINE HOLDER—E. Howard, Sheep Ranch, Cal.
- 384,367.—FEATHERING PADDLE-WHEEL—R. J. Jones, Carrollton, W. T.
- 384,534.—WAGON SEAT—W. A. Laid, Colfax, W. T.
- 384,371.—FRUIT-STONING MACHINE—Benj. A. Little, S. F.
- 384,542.—SEAL LOCK—O. C. Pratt, San Rafael, Cal.
- 384,285.—ASTRONOMICAL APPARATUS—E. L. Rugg, Wood and, Cal.
- 384,549.—MACHINE FOR MAKING HONEY FRAMES—Jas. Ware, Madera, Cal.
- 18,379.—DESIGN—J. B. Clifford, S. F.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**FRUIT-STONING MACHINES.**—Benjamin A. Little, S. F. No. 384,371. Dated June 12, 1888. This is one of the class of machines for stoning fruit, and is especially adapted for the larger and flesh clinging fruit, such as cling-stone peaches, etc. The invention consists in the novel jutting and gripping knives, their peculiar arrangement, and the mechanism by which they are operated; in the scrapers on which the fruit rests and their novel arrangement and operation.

**AUTOMATIC SAMPLING APPARATUS.**—Allen Bradford, Wardner, Idaho, assignor of one-half to Victor M. Clement. No. 384,420. Dated June 12, 1888. This apparatus is intended for sampling the pulp or tailings of quartz-mills. It consists of an improved vibratory sampling-cup arranged to traverse the stream of pulp or tailings, whereby a portion of said stream is directed away from its general course into a suitable receptacle. There is a pivoted swinging frame which carries the sampling cup, having a cross-head on each end of what is a self-discharging vessel for water. A tilting tank is adapted to receive water on each end alternately, and to discharge it into the vessels of the swinging frame, whereby the movement of the frame is made automatic. This apparatus is complete in itself and automatic in all its workings, being absolutely accurate in the sample taken, and capable of being regulated to any degree of speed so as to obtain any size of sample, the sample being ready, at any period of the run for the assayer. It is adapted to any class of pulp and can be placed in any part of the mill where a periodical sample is desired.

San Francisco Metal Market.

WHOLESALE.		THURSDAY, JUNE 21, 1888.	
ANTIMONY—French Star.	9 @ 7	—	—
BORAX—Refined.	7 @ 7	—	—
Powdered.	7 @ 7	—	—
Concentrated.	61 @ 7	—	—
COPPER—			
Bolt.	26 @ —	—	—
Sheeting.	26 @ —	—	—
Ingot.	— @ 20	—	—
Fire Bar Sheet.	— @ 25	—	—
Iron—Glenbrook ton.	— @ 28 50	—	—
Eglinton, ton.	— @ 27 00	—	—
American Soft, No. 1, ton.	— @ 31 00	—	—
Oregon Pig, ton.	21 @ 23 00	—	—
Olay Lane White.	— @ 23 00	—	—
Shots, No. 1.	— @ 29 50	—	—
Bar Iron (base price) 10 lb.	24 @ —	—	—
LEAD—Pig.	5 00 @ 5 12	—	—
Bar.	5 25 @ 5 50	—	—
Sheet.	8 @ —	—	—
Pipe.	7 @ —	—	—
Shot, discount 10% on 500 bag.	Drop, 1 bag.	1 80 @ —	—
Back, 1/2 bag.	2 @ —	—	—
Chilled, do.	1 @ —	—	—
STEEL—English, lb.	16 @ 25	—	—
Black Diamond tool.	10 @ 20	—	—
Pick and Hammer.	8 @ 9	—	—
Machine.	6 @ 8	—	—
Toe Chalk.	4 @ 8	—	—
TINPLATE—Goke.	5 75 @ 6 50	—	—
Charcoal.	6 75 @ 7 25	—	—
QUICKSILVER—By the flask.	37 50 @ 38 50	—	—
Flasks, new.	1 05 @ —	—	—
Flasks, old.	85 @ —	—	—

Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send none but worthy men.

G. W. H. LAMPADIER—Santa Barbara Co.  
G. W. INGLE—Arizona Territory.  
A. F. JEWETT—Tulare Co.  
C. E. WILLIAMS—Yuba and Sutter Co.'s.  
R. G. HUSTON—Montana Territory.  
WM. WILKINSON—Butte and Tehama Co.'s.  
W. W. THEOBALD—Solano and Sonoma Co.'s.

Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING MAY 31.	WEEK ENDING JUNE 7.	WEEK ENDING JUNE 14.	WEEK ENDING JUNE 21.
Alpha.	1.60	3.20	1.50	1.75
Alta.	1.0	2.25	1.00	1.55
Andes.	1.10	1.50	1.10	1.25
Argenta.	1.15	1.35	1.15	1.50
Belcher.	4.70	1.35	4.35	4.40
Brophy.	3.40	6.25	2.50	3.00
Best & Belcher.	3.40	6.25	2.50	3.00
Bullion.	1.40	2.20	1.20	1.35
Baltimore.	1.75	1.10	1.60	1.85
Belle Isle.	1.50	1.50	1.50	1.50
Bodie.	2.35	3.00	2.05	2.25
Benton.	1.00	1.00	1.00	1.00
Bodie Tunnel.	1.00	1.00	1.00	1.00
Bulwer.	1.00	1.00	1.00	1.00
Con. Va. & Cal.	1.00	1.00	1.00	1.00
Challenge.	1.00	1.00	1.00	1.00
Champion.	1.00	1.00	1.00	1.00
Chollar.	1.00	1.00	1.00	1.00
Confidence.	1.00	1.00	1.00	1.00
Con. Imperial.	1.00	1.00	1.00	1.00
Calaveras.	1.00	1.00	1.00	1.00
Con. Pacific.	1.00	1.00	1.00	1.00
Crown Point.	1.00	1.00	1.00	1.00
Crocker.	1.00	1.00	1.00	1.00
Central.	1.00	1.00	1.00	1.00
Durand.	1.00	1.00	1.00	1.00
East B. & B.	1.00	1.00	1.00	1.00
Eureka Con.	1.00	1.00	1.00	1.00
Exchequer.	1.00	1.00	1.00	1.00
Grand Prize.	1.00	1.00	1.00	1.00
Gould & Curry.	1.00	1.00	1.00	1.00
Hale & Norcross.	1.00	1.00	1.00	1.00
Holmes.	1.00	1.00	1.00	1.00
Independence.	1.00	1.00	1.00	1.00
Iron.	1.00	1.00	1.00	1.00
Julia.	1.00	1.00	1.00	1.00
Justice.	1.00	1.00	1.00	1.00
Kentuck.	1.00	1.00	1.00	1.00
Lady Wash.	1.00	1.00	1.00	1.00
Mono.	1.00	1.00	1.00	1.00
Mexican.	1.00	1.00	1.00	1.00
Met. Diablo.	1.00	1.00	1.00	1.00
Northern Belle.	1.00	1.00	1.00	1.00
N. & V.	1.00	1.00	1.00	1.00
North Belle Isle.	1.00	1.00	1.00	1.00
Niag.	1.00	1.00	1.00	1.00
Nev. Queen.	1.00	1.00	1.00	1.00
North G. & C.	1.00	1.00	1.00	1.00
Occidental.	1.00	1.00	1.00	1.00
Ophir.	1.00	1.00	1.00	1.00
Overman.	1.00	1.00	1.00	1.00
Potosi.	1.00	1.00	1.00	1.00
Peru.	1.00	1.00	1.00	1.00
P. Sheridan.	1.00	1.00	1.00	1.00
Silver Star.	1.00	1.00	1.00	1.00
Savage.	1.00	1.00	1.00	1.00
S. B. & M.	1.00	1.00	1.00	1.00
Sierra Nevada.	1.00	1.00	1.00	1.00
Silver Hill.	1.00	1.00	1.00	1.00
Silver King.	1.00	1.00	1.00	1.00
Scorpion.	1.00	1.00	1.00	1.00
Syncline.	1.00	1.00	1.00	1.00
Union Con.	1.00	1.00	1.00	1.00
Utah.	1.00	1.00	1.00	1.00
Yellow Jacket.	1.00	1.00	1.00	1.00

Mining Share Market.

The stock market still continues dull and unattractive. The recent advance in prices is not by any means sustained. Meantime the Comstock mines are turning out more bullion than ever. During May the Chollar mine worked 1500 tons of ore, yielding bullion to the assay value of \$24,551.60. The cost of reducing was \$10,500, and the net proceeds in bullion were valued at \$14,051.60. The average assay value of the ore per ton was \$21.73, and the gross average per ton in bullion was \$16.36. The net average per ton was \$9.36.

The official statement of the ore worked and bullion produced for account of the Consolidated California and Virginia mine during the month of May is as follows: There was worked at the Morgan mill 5240 tons of ore yielding bullion valued at \$150,111.41, of which \$71,012.62 was gold and \$79,098.79 was silver. The yield in bullion per ton was \$28.64, and the average assay value of the battery samples was \$35.91 per ton. There was worked at the Eureka mill 3300 tons of ore yielding bullion valued at \$261,061.72, of which \$120,689.21 was gold and \$140,372.51 was silver. The average yield in bullion per ton was \$31.45 and the average assay value of the battery samples was \$36.12 per ton. There was worked at both mills a total of \$13,540 tons of ore, yielding bullion valued at \$411,173.13, of which \$191,701.83 was gold and \$219,471.30 was silver. The yield in bullion per ton of ore was \$30.36 and the average assay value of the ore per ton was \$36.04. Attention is directed to the unusually large amount of gold contained in the bullion produced last month, which affects a great saving to the company on account of the heavy discount on silver.

The ore-producing sections of all the leading Comstock mines are looking and yielding well.

Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:

Con. California and Virginia, June 16, \$65,431; Confidence, 15, \$16,067; Hale and Norcross (for May) \$141,921; Hanauer, 12, \$27,000; Crescent, 12, \$33,500; Queen of the Hills, 12, \$85,000; Hanauer, 12, \$22,225; Germania, 13, \$39,900; Richmond Con., 15, \$14,925; Eureka Con., 15, \$20,600; Germania, 14, \$16,999; Hanauer, 14, \$15,500; Queen of the Hills, 14, \$10,000; Argus, 15, \$13,271; Hanauer, 15, \$18,000; Germania, 16, \$15,555; Hanauer, 16, \$22,000; Crescent, 16, \$4,500; Chollar, 17, \$33,334; Confidence, 16, \$18,694; North Belle Isle, 20, \$26,000.

AN Eastern manufacturer is visiting Marysville, and is seriously thinking of building a cotton factory there. He says cotton can be shipped at a less expense from Texas to California than it can from North Carolina to Massachusetts.

GENERAL SHERIDAN continues to improve in health.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

**ASSESSMENTS.**

COMPANY.	LOCATION, No.	AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.
Alta M Co.	Nevada, 37.	50.	May 12, June 18.	July 9, W. H. Watson.	302 Montgomery St
Arnold M Co.	Arizona, 4.	75.	May 1, June 4.	June 26, A. Judson.	320 Sansome St
Bulwer Con M Co.	California, 4.	29.	May 3, June 7.	July 5, L. Osborn.	349 Montgomery St
Best & Belcher M Co.	Nevada, 40.	25.	June 5, July 10.	July 31, L. Osborn.	349 Montgomery St
Bodie Tunnel M Co.	California, 15.	25.	June 5, July 9.	July 31, C. Harvey.	303 California St
Challenge Con M Co.	Nevada, 4.	50.	May 28, June 22.	July 18, O. L. McCoy.	339 Pine St
Champion M Co.	California, 3.	10.	May 11, June 13.	July 10, T. W. 12.	322 Montgomery St
California State Co.	California, 1.	10.	Apr 18, May 24.	June 25, J. O. Hanson.	10 California St
Diana G & S M Co.	Nevada, 7.	10.	June 5, July 10.	July 31, J. W. Pew.	310 Pine St
Eldred M Co.	California, 2.	01.	May 28, June 18.	July 30, N. A. Eldred.	15-3 California St
Justice M Co.	Nevada, 46.	25.	May 7, June 11.	July 2, R. E. Kelley.	419 California St
Nye M Co.	Nevada, 1.	45.	May 27, June 10.	July 24, W. J. Doran.	401 California St
Occidental Con M Co.	Nevada, 2.	20.	May 29, July 2.	July 25, A. K. Burdrow.	349 Montgomery St
Russell Reduction & M Co.	California, 2.	10.	June 6, July 9.	July 31, J. Morziz.	328 Montgomery St
Sunmit M Co.	California, 10.	10.	June 8, July 11.	July 31, G. W. Session.	349 Montgomery St
Seg Belcher & Miles Con M Co.	Nevada, 1.	25.	June 5, July 9.	July 30, E. B. Holmes.	309 Montgomery St
Southern Cal Coal & Clay Co.	Cal., 1.	10.	May 25, June 28.	July 25, W. C. Muzal.	10 California St
Scorpion M Co.	Nevada, 25.	10.	May 15, June 22.	July 16, G. R. Spinnay.	310 Pine St
Toga M Co.	California, 18.	10.	May 1, June 5.	June 27, B. L. Busing.	309 Montgomery St
Utah Con M Co.	Nevada, 4.	15.	May 4, June 8.	June 26, A. H. Fish.	309 Montgomery St

MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING	DATE.
Best & Belcher M Co.	Nevada.	I Osborn.	309 Montgomery St.	Annual.	July 6
North Belle Isle M Co.	California.	J W Pew.	310 Pine St.	Annual.	June 27
Owyhee M Co.	Idaho.	J W Pew.	310 Pine St.	Annual.	June 28
Phil Sheridan Con M Co.	Nevada.	J F Holding.	533 Kearny St.	Annual.	June 30
Trojan M Co.	Nevada.	J F Holding.	533 Kearny St.	Annual.	June 30
West Con Cal & Virginia.	Nevada.	I B Brandt.	3.6 Pine St.	Annual.	June 27

LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada, A. W. Havens.	309 Montgomery St.	50	June 11	
Confidence S M Co.	Nevada, A. S. Groth.	309 Montgomery St.	2.00	June 12	
Eureka Con M Co.	Nevada, H. R. P. Hutton.	306 Pine St.	25	July 9	
North Belle Isle M Co.	Nevada, J. W. Pew.	310 Pine St.	50	May 7	
Owhee M Co.	Nevada, J. F. Holding.	309 Montgomery St.	50	May 7	
Oregon Coal & Navigation Co.	Oregon, R. B. Williams.	211 Sansome St.	1.50	Mar 2	
Pacific Borax, Salt & Soda Co.	California, A. H. Clough.	230 Montgomery St.	1.00	June 11	
Standard Con M Co.	California, J. W. Pew.	310 Pine St.	65	June 12	

Sales at San Francisco Stock Exchange.

WEDNESDA June 20.		50 Justice.	1.05
150 Alta.	1.50	200 Lady Wash.	.40
50 Andes.	.75	180 Mexican.	4.05
400 Alpha.	1.50	250 Mono.	1.40
100 Baltimore.	.75	50 N. Belle Is.	3.25
250 Belcher.	4.50	100 Ophir.	.75
60 B. & Belcher.	3.30	250 Overman.	1.80
100 Bullion.	1.25	200 Occidental Con.	1.15
200 Bodie.	.25	100 Peer.	.70
200 Bulwer.	.80	70 Potosi.	.35
140 Challenge.	4.50	200 Savage.	.70
50 Chollar.	4.00	100 Scorpion.	.75
70 Con Va & Cal.	.10	250 S. B. & M.	2.85
270 Crown Point.	4.50	50 Sierra Nevada.	3.80
425 Con Imperial.	.50	250 Union Con.	3.50
100 Confidence.	.18	150 Utah.	1.60
200 Exchequer.	1.15	300 W Comstock.	.90
50 Gould & Curry.	3.70	150 Yellow Jacket.	4.90
200 Hale & Nor.	.75		

Don't Fail to Write.

Should this paper be received by any subscriber who does not want it, or beyond the time he intends to pay for it, let him not fail to write us direct to stop it. A postal card (costing one cent only) will suffice. We will not knowingly send the paper to anyone who does not wish it, but if it is continued, through the failure of the subscriber to notify us to discontinue it, or some irresponsible party requested to stop it, we shall positively demand payment for the time it is sent. LOOK CAREFULLY AT THE LABEL ON YOUR PAPER.

DIVIDEND NOTICE.

**SAN FRANCISCO SAVINGS UNION, 532** California St., cor. Webb.—For the half year ending with 30th June, 1888, a dividend has been declared at the rate of four and one half (4 1/2) per cent per annum on term deposits, and three and three-fourths (3 3/4) per cent per annum on ordinary deposits, free of taxes, payable on and after Monday, 21 July, 1888.

LOVELL WHITE, Cashier.

DIVIDEND NOTICE.

**THE GERMAN SAVINGS AND LOAN** Society, 526 California St.—For the half-year ending June 30, 1888, a dividend has been declared at the rate of four and one-half (4 1/2) per cent per annum on term deposits, and three and three quarters (3 3/4) per cent per annum on ordinary deposits. Payable on and after Monday, July 2, 1888.

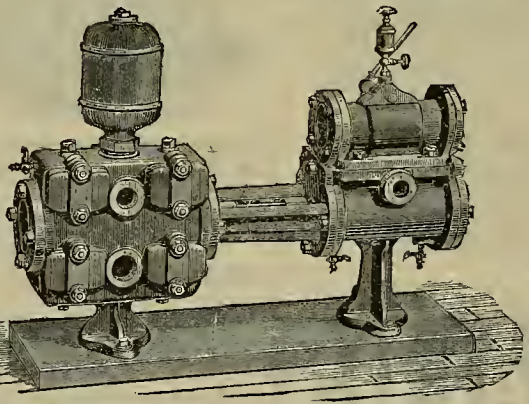
WM. HERRMANN, Secretary.

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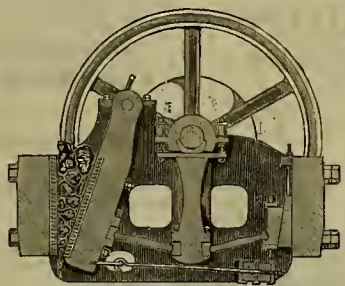
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A half interest in a gold bearing quartz mine, situated at Mokelumne Hill, Calaveras County. Two shafts sunk 60 and 110 feet, respectively; also a level run at the bottom of the 110 foot shaft about 100 feet. The ore body averaged three feet strong, and varied from \$10 to \$20 per ton. A tunnel was since run 300 feet, and a ledge has been struck which is four feet in width. This ore will yield \$5 to \$6 per ton. It is only sixty feet from the surface. The object of selling the above-named interest is to obtain some responsible party, with means, to sink a shaft 300 feet, and run several drifts along the ledge. The present owners ceased operations for want of working capital. None but principals need apply. The party purchasing must commence operations within thirty days from date of signing contract and work continuously and systematically till the shaft is completed. It is patented property. Address,

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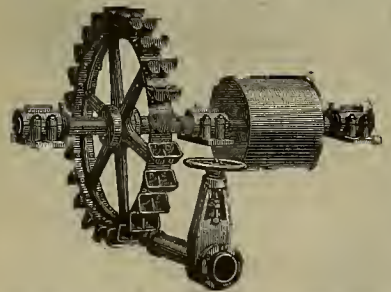
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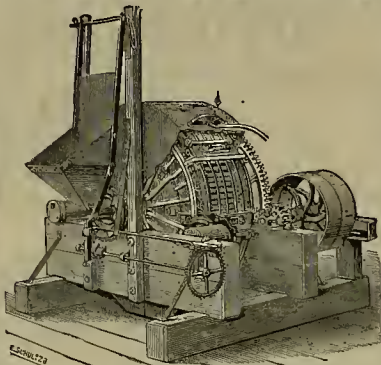
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**MARINE ENGINES AND BOILERS.**—Propeller Engines, either High Pressure or Compound, Stern or Side-wheel Engines.

**MINING MACHINERY.**—Hoisting Engines and Works, Cages, Ore Buckets, Ore Cars, Pumping Engines and Pumps, Water Buckets, Pump Columns, Air Compressors, Air Receivers, Air Pipes.

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**Water Pipe, Pump or Air Columns, Fish Tanks for Salmon Canneries**

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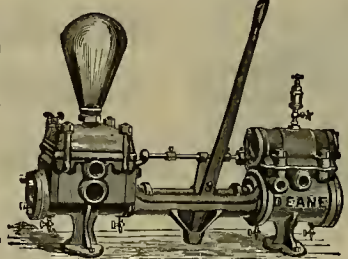
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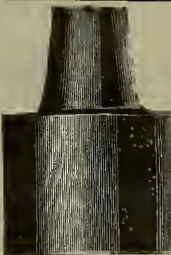
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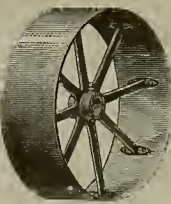
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SOLE AGENT FOR  
Adamantine Shoes, Dies and  
CRUSHER PLATES,  
—AND—  
Chrome Cast Steel for  
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ADAMANTINE.



PAT. OCT. 25, 1881.

## PERFECT PULLEYS

First Premium Awarded at Mechanics' Fair, 1884.

## CLOT & MEESE,

Sole Licensed Manufacturers of the

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For the States of California, Oregon and Nevada, and the Territories of Idaho, Washington, Montana, Wyoming, Utah and Arizona. Lightest, Strongest, Cheapest and Best Balanced Pulley in the World. Also Manufacturers of

## SHAFTING, HANGERS AND APPURTENANCES

SEND FOR CIRCULAR AND PRICE LIST.

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**ENGINES, BOILERS, SHAFTING,**

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—BUILDER OF—

Steam Engines, Flour Mill,  
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Brodie Rock Crushers,  
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Manufacture Iron Castings and Machinery  
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**Mold-Board AMALGAMATORS,**

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## FOR SALE.

2 Triumph Concentrators.

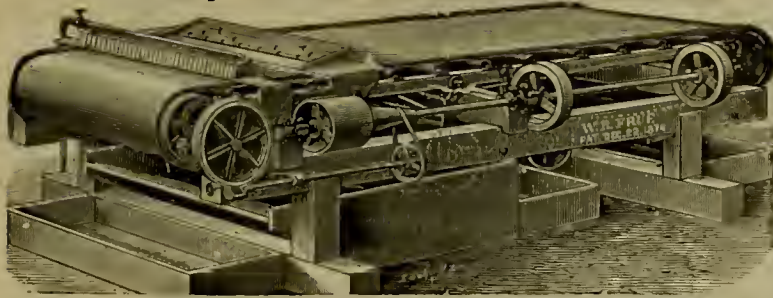
1 New 12-inch, 35 H. P. Engine.

VERY CHEAP. Apply

130 Sansome St., room 12.



# \$1,000 CHALLENGE!



**THE FRUE ORE CONCENTRATOR  
OR VANNING MACHINE.**

**PRICE: FIVE HUNDRED AND SEVENTY-FIVE DOLLARS  
(\$575.00) F. O. B.**

OVER 1400 ARE NOW IN USE. Concentrations are clean from the first working. The wear and tear are merely nominal. A machine can be seen in working order and ready to make tests at 220 Fremont Street, San Francisco.

THE MONTANA COMPANY (Limited), LONDON, October 8, 1885.

DEAR SIR:—Having tested three of your Frue Vanners in a competitive trial with other similar machines (Triumph), we have satisfied ourselves of the superiority of your Vanners, as is evidenced by the fact of our having ordered twenty more of your machines for immediate delivery. Yours truly,

THE MONTANA COMPANY (Limited).

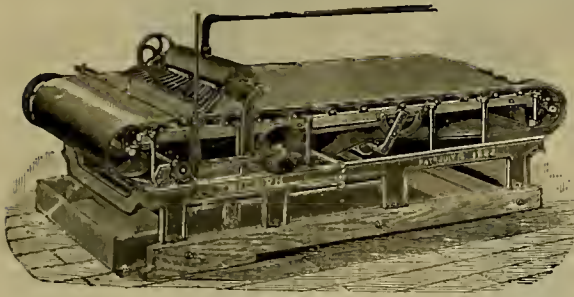
N. B.—Since the above was written the 20 Vanners having been started gave each satisfaction that 44 additional Frues and more stamps have been purchased.

ADAMS & CARTER.

Protected by patents May 4, 1869; December 22, 1874; September 2, 1879; April 27, 1880; March 22, 1881; February 20, 1883; September 18, 1883. Patents applied for.

**ADAMS & CARTER, Agents Frue Vanning Machine Co.,  
Room 7, No. 109 California Street, SAN FRANCISCO, CAL.**

# \$1,000 CHALLENGE ACCEPTED, PRICE, FIVE HUNDRED AND FIFTY DOLLARS (\$550.00).



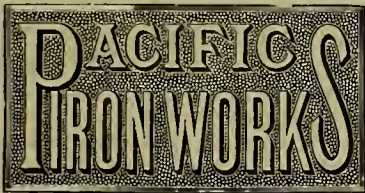
**THE  
"TRIUMPH" ORE CONCENTRATOR.**

The present improved form of the celebrated "TRIUMPH" Ore Concentrator possesses many advantages over any other style of Vanners, Vanning Machines, or Concentrators, yet introduced to the notice of mining men. These advantages consist in the superior features which enter into their construction, and facilitate their operation.

They are constructed in the best manner; their frames being of iron, insures their solidity, durability, and perfect steadiness of motion when operated. They are built as compactly as their requisite strength will permit, weigh less, require less freight space in boxes, by which their cost of transportation is reduced, and occupy less mill room when set up.

An important improvement has recently been introduced into their construction, which consists of a RIFFLE TABLE placed in front of and which takes the discharge from the feed and amalgam bowl. The improvement is in the reciprocal motion which is imparted to this table by the longitudinal motion of the shaking frame to which the table is attached. We have at hand many testimonials, from well-known Superintendents of mines in different mining districts of the United States, hearing evidence of the efficiency and superiority of this form of Concentrator, and we shall be pleased to send Circulars covering such letters of testimony, and, as well, directions for setting up and operating these machines, and are ready to quote special prices for any considerable order.

**JOSHUA HENDY MACHINE WORKS,  
Nos. 39 to 51 Fremont St., San Francisco, Cal.**



1850. BUILDERS OF 1888.

**MINING MACHINERY.**

GENERAL OFFICE AND WORKS:

127 First St., San Francisco, Cal., U. S. A.  
New York Office, 145 Broadway.

PLANTS FOR GOLD AND SILVER MILLS, embracing machinery of LATEST DESIGN and MOST IMPROVED construction. We offer our customers the BEST RESULTS OF 38 YEARS' EXPERIENCE in this SPECIAL LINE of work, and are PREPARED to furnish the MOST APPROVED character of MINING AND REDUCTION MACHINERY, adapted to all grades of ore and SUPERIOR to that of any other make, at the LOWEST POSSIBLE PRICES.

We are also prepared to CONSTRUCT and DELIVER in COMPLETE RUNNING ORDER, in any locality, MILLS, CONCENTRATION WORKS, WATER JACKET SMELTING FURNACES, HOISTING WORKS, PUMPING MACHINERY, ETC., ETC., of any DESIRED CAPACITY.

# The Pelton Water Wheel

Gives the highest efficiency of any Wheel made, and is the standard for high pressure service in all parts of the world. Over Five Hundred are in use on the Pacific Coast alone, running Quartz Mills, Hoisting and Pumping Works, Electric Plants for power and light, as well as for various manufacturing purposes.

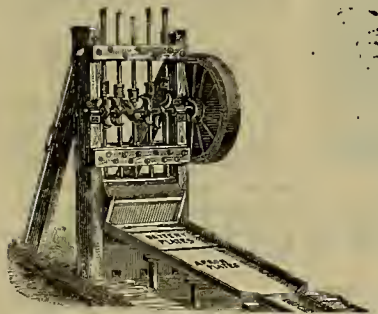
They are adapted to any head of water from 20 feet up to 2000 feet. These Wheels are now coming largely into use in connection with Electrical Transmission, furnishing power which is carried long distances with but small loss.

Address:

**THE PELTON WATER WHEEL CO.,  
127 First Street, San Francisco, Cal., U. S. A.**

A. P. BRAYTON, JR., General Manager.

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## Silver-Plated Amalgamating Plates

For Saving Gold in QUARTZ, GRAVEL and PLACER MINING,

At reduced rates. Get our prices. Three thousand orders filled. Fifteen medals awarded. Our plates have proved the best, and far superior to others in weight of silver and durability. Old mining plates replated. These plates can also be purchased of JOHN TAYLOR & CO., cor. First and Mission Sts.

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NOTICE.—Our Silver Plated Plates have always proved as represented. We have been manufacturing them for 20 years, and use only the best Lake Superior Copper and Refined Silver. Comparing our plates with those of other manufacturers, after repeated tests, we can safely guarantee much better plates for the same money. Our plates are used by all the prominent mining men on the Pacific Coast. SEND FOR CIRCULAR.



## F. A. HUNTINGTON,

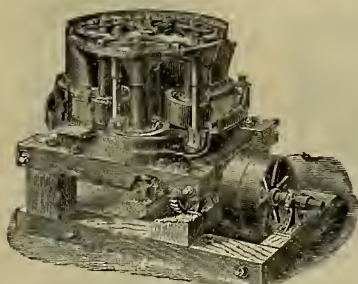
MANUFACTURER OF

## Centrifugal Roller Quartz Mills, CONCENTRATORS AND ORE CRUSHERS,

Mining Machinery of Every Description,

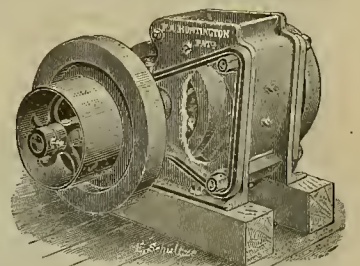
**Steam Engines and Shingle Machines.**

SEND FOR CIRCULAR.



Centrifugal Roller Quartz Mill.

No. 45 FREMONT STREET, - - SAN FRANCISCO, CAL.

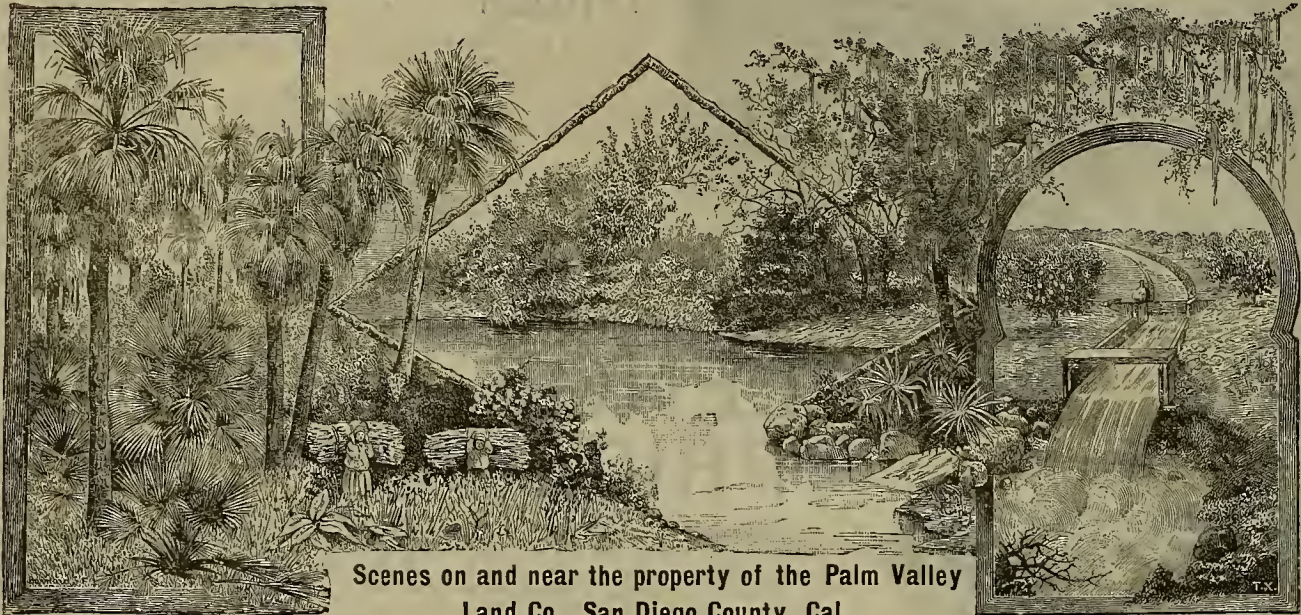


ORE CRUSHER



# PALM VALLEY!

## Tropical Wonderland!



Scenes on and near the property of the Palm Valley  
Land Co., San Diego County, Cal.

**EARLIEST FRUIT LAND IN THE WORLD!**  
**EARLIEST VEGETABLE LAND IN THE WORLD!**  
**FINEST WINTER CLIMATE IN THE WORLD!**

DO YOU WANT to buy a fine tract of land at a low figure, that will double in value in three months, and that will produce a crop in six months that will more than pay for the land?

DO YOU WANT a tract of land that will produce ripe grapes six weeks in advance of any other section of California now cultivated?

DO YOU WANT a tract of land that will raise watermelons that will ripen seven weeks earlier than they will in any other section in the State, and that will sell for a dollar apiece in Los Angeles, Riverside, San Diego, San Bernardino, San Francisco, or any other Pacific Coast town or city?

DO YOU WANT a tract of land where there is practically no frost?

DO YOU WANT a tract of land where no hard wind strong enough to blow fruit from the trees is ever known?

DO YOU WANT a portion of the tropical valley of the State?

DO YOU WANT to quadruple your money on short notice? There is a chance for you to do it.

THE PALM VALLEY LAND CO. has secured 2000 acres of this choice land; has subdivided it into 5 and 10-acre lots, which they are now selling at \$200 per acre, with a PERPETUAL WATER RIGHT, sufficient to irrigate the land.

The lands were placed on the market with the announcement that as soon as each hundred acres were sold, the price would be advanced \$25 per acre, and that this rule would be followed up to the selling of 500 acres. Two hundred acres have now been sold on this basis, starting at \$150 per acre. The price is now \$200 per acre.

The Company has a Stone-walled Irrigating Canal, Over Ten Miles in Length, Completed.

They have completed a railroad from Seven Palms, a station on the main line of the Southern Pacific Railroad, to PALMDALE, the townsite owned by the Company.

They are planting 160 acres to an Orange Grove, of Navel Oranges, and many other improvements are now in progress, that will make this one of the most attractive Colonies in the State.

No safer place for the investment of capital, and no more delightful place to live in the winter can be found.

PALM VALLEY is sure to become the greatest sanitarium in the world.

**THERE IS NO FROST, NO FOG, NO HARD WINDS.**

There is here all that can be desired to make Palm Valley one of the most attractive places in Sunny Southland. Maps, circulars and further information by calling on or addressing

**BRIGGS, FERGUSON & CO., General Agents, 314 California St., San Francisco, Cal.**

**Huntington  
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Company,**

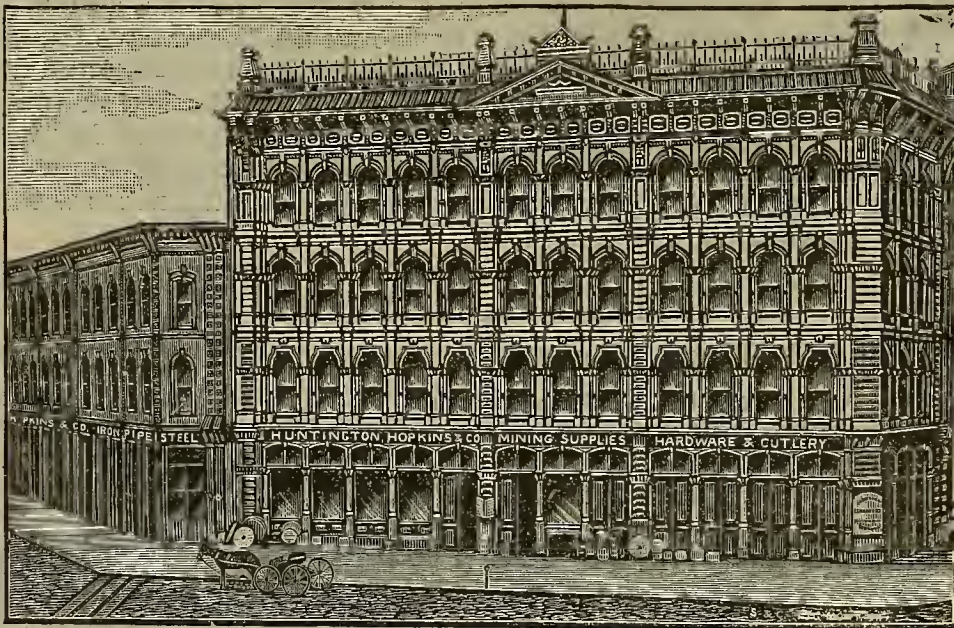
Incorporated Feb. 23, 1886.

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**HARDWARE,  
Steel and Iron.**

**BUILDERS',  
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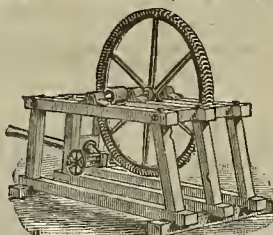
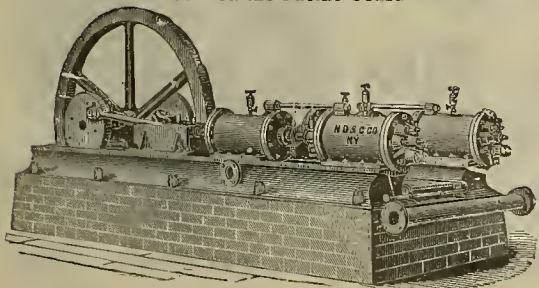
**CORRUGATED IRON.**

# COMPRESSED AIR and WATER POWER MACHINERY.

**RIX & FIRTH, 225 and 227 First St., San Francisco.**

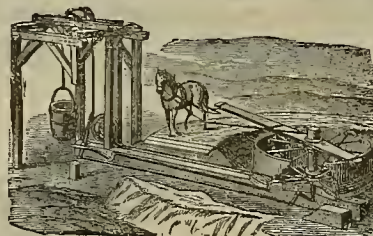
**NATIONAL AIR COMPRESSORS.**

SINGLE OR DUPLEX, STEAM OR BELT POWER.  
62 Sold on the Pacific Coast.



**KNIGHT'S WATER WHEEL,**  
—FOR—

**MILLS, PUMPING AND HOISTING.**  
Over 300 in use. All estimates guaranteed. Send for Circular.



**MINERS' HORSE WHIM.**

All wrought iron. No gears, no breakage. One horse will easily handle rock or water to a depth of 20 feet, giving entire satisfaction to the prospector. Price, complete, \$200. 150 sold on this Coast.



**NATIONAL ROCK DRILL.**  
200 Sold on this Coast. Has less repairs than any other Drill.



# MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.  
Publishers.

SAN FRANCISCO, SATURDAY, JUNE 30, 1888.

VOLUME LV.  
Number 26.

## Importation of Lead Ores.

The investigations called for by Senator Stewart of Nevada in regard to the importation of lead ores through the Custom-house at El Paso, Texas, is a move in the right direction. If the Mexican mine-owners find that they can ship the products of their mines to the United States for reduction, and thereby realize a greater profit, it stands to reason that they will do so; but, while the Mexican miners gain a profit, it is at the expense of the miners in the United States. The smelting works require a certain quantity of ore per annum to keep them in full blast, and as their profit comes from the amount charged per ton for smelting, it is immaterial to them whether the ores on which they run come from the United States or Mexico.

In importing ores they are properly classified as gold, silver, lead, etc., according to the predominating value of the metal they contain; it is just here where the shoe pinches. Most of the ores imported through the El Paso Custom house are literally gold and silver ores, but as a rule they contain lead, often to such an extent that they practically become smelting ores.

These ores are imported as gold or silver ores, as the case may be, no account whatever being taken of the lead they contain. It will readily be seen that it is very much to the advantage of the smelter to import the rich ores of Mexico. When they contain from 10 to 15 per cent of lead, the high value of the gold or silver in the ore brings the lead in free of duty. The lead helps the smelter out with his problem, but once it comes into the market it is there at the expense of the lead-producing mines of the United States.

It would be far more just to enter an ore, giving the per cent or value of its constituent metals and on these values assess the duty and not as at present class the ore according to the metal of greatest commercial value contained in it.

The smelter must have a certain amount of lead in order to conduct his operations; under the present construction of the law smelters who draw a supply from Mexico get the necessary article much cheaper than their competitors who are compelled to purchase lead ores mined in the United States.

The cost per ton of producing ores is generally higher in the United States than in Mexico. The latter country can produce unlimited quantities of lead ores, carrying silver and often gold. With the present facilities for transporting ores from Mexico to the United States it is only a question of time, unless some means are employed to make the Mexican flux (the lead ores imported should be considered more in the light of a flux than an ore to be worked for its contained lead) cost as much as the same article produced in the United States.

Senator Stewart thoroughly understands the situation of mining in the United States. This

is appreciated by his fellow Statesmen, and it is safe to say that any measures he may introduce into the Senate looking to the advancement of mining interests in the United States will be carried through.

DESSICATED HUMAN REMAINS.—Bulletin No. 1 of the California State Mining Bureau gives a

LONG MILL RUN.—The North Bell Isle mine, Nev., made a mill run during the past year which covers a period of 251 days, of which the actual running time was 241 days, showing a loss of 10 days, occasioned by such stoppages as are incidental to a prolonged mill run. Three thousand and fifteen and sixty-hundredth tons of ore were milled with 10 stamps, showing an

## William's Superheating Smelting Furnaces.

The accompanying engravings are an elevation and section through one of William's improved smelting furnaces, arranged for copper smelting.

These furnaces are in many respects a departure from ordinary practice, and give very desirable results especially as to fuel economy. The furnace proper is of the water-jacket type, the water extending all the way to the bottom as shown in Fig. 2.

Above the water-jacket is placed a superheater (A) exposed to the hot gasses inside and connected to the tuyeres by six dam pipes as shown. Air is forced in at the large nozzle seen in Fig. 1, and before reaching the tuyeres is raised to a temperature of from 300 to 500 degrees, the process being the same in principle as that employed in smelting iron.

The saving in fuel thus affected is two per cent for each 100 degrees of heat added to the air and amounts in all to from 6 to 10 per cent, a very important item in the cost of smelting, especially at present prices of fuel. Another novel feature of these furnaces is the adjustable bottom plate, arranged as seen in the section. This can be raised or lowered to suit the nature of the ore being worked or other requirements, and can easily be removed entirely so as to substitute a lead-smelting bottom.

This latter is not shown in the drawings but forms a part of the system, the change being only in substituting a lead well siphon and other required apparatus for the "copper bottom."

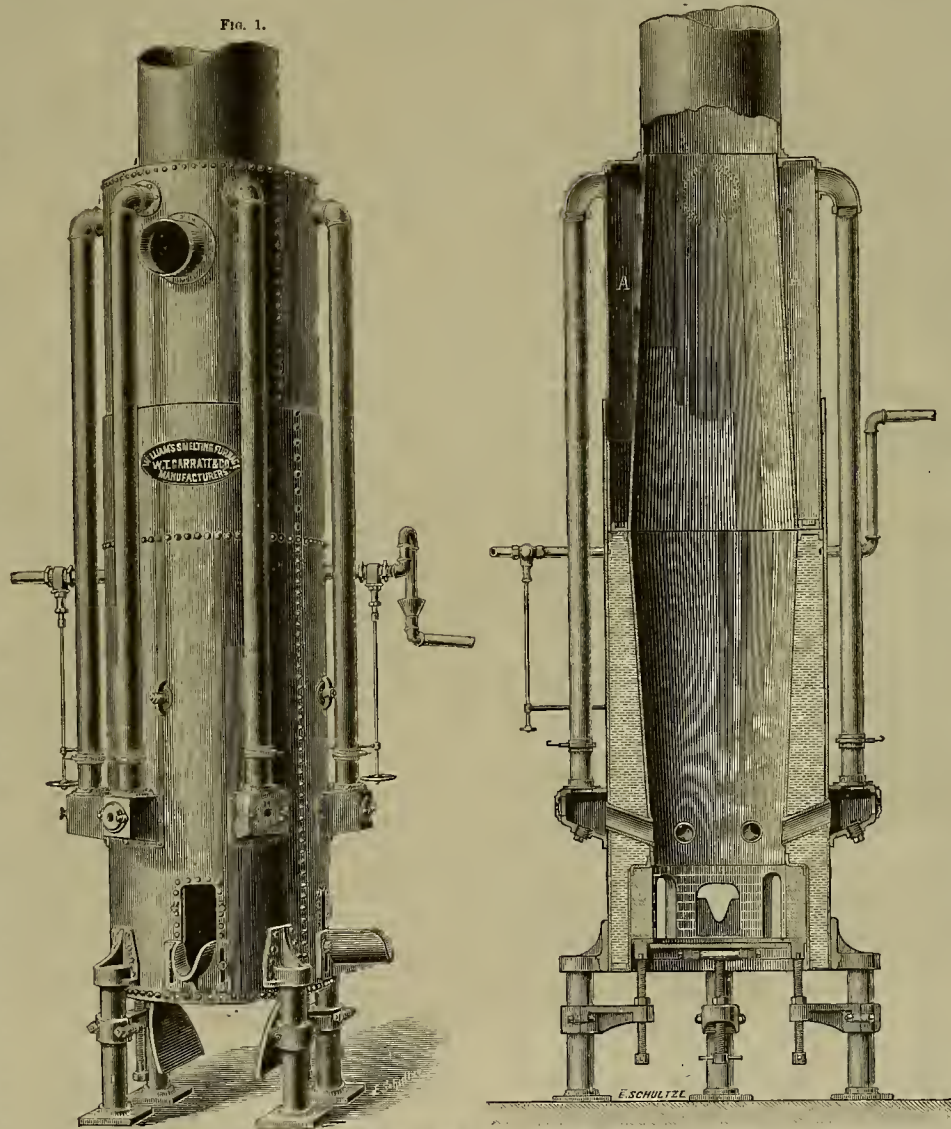
The furnace is not mounted on a flat plate in the usual manner, but is supported on four legs or pillars made of wrought iron pipe, screwed into brackets, riveted to the outer shell as shown. In transporting the furnaces, these legs, the bottom frame, spouts, and so on, are removed to avoid weight in handling.

The tuyere boxes are arranged with closing slides so the blast can be shut off from any one in case of clogging.

The means of water circulation and many other features of the furnaces are similar to common practice. They are made of the usual dimensions, for copper, lead, or other ores. They are constructed by W. T. Garratt & Co., of this city.

OUR coast collieries sent us last week 30,616 tons of coal, and 10,017 tons of foreign coal came to this port. The coast collieries are sending along their full quota, and present quotations leave them a very handsome profit, and the disengaged tonnage here at present enables them to secure favorable freight rates.

THE mine owned by Messrs. Tryon, McCreeght and Hardy, a mile from Carson Hill, Calaveras county, has been sold to San Francisco parties for the magnificent sum of \$100,000. For over six months this mine has been yielding from \$5000 to \$10,000 per month.



WILLIAM'S IMPROVED SUPERHEATING SMELTING FURNACES.

description of the dessicated human remains from the Sierra Madre mountains in Mexico. The mummies were purchased by J. Z. Davis and presented to the Bureau, and the pamphlet was written by Dr. Winslow Anderson of this city. Artotypes accompany the report. The descriptive matter is of interest to ethnologists. At the same time we should have preferred to see Bulletin No. 1 of the California State Mining Bureau with some such title as this: "Results of Milling Gold Ores in California." When such subjects as this are thoroughly treated, it will be time enough for the California Mining Bureau to tell us about the ethnology of Mexican races. It may be said, however, that the Bureau is now collecting data about gold mines, and in due time the results will be printed.

average crushing of 12½ tons per day. The average battery pulp assay was \$214.64 per ton. The net assay value of the million produced was \$564,955.09. The results of this mill run have been very satisfactory when the condition of the mill, the lack of many of the improved appliances of the present day and the rebellious character of the ore are considered (containing as it does 30 per cent iron pyrites, 4 to 6 per cent zinc sulphide, antimony and arsenic sulphides, and other bases). Much credit is due to the mill superintendent, E. L. McMahan, for the working results attained, and it also demonstrates the fact that ores of this district, of however rebellious a nature, can be worked to a very high per cent if the desulphurizing and chloridising facilities are adequate.



## CORRESPONDENCE.

We admit, unadorned, opinions of correspondents. — EDS.

## Mining Debris.

## The Possibility of Impounding It.

EDITORS PRESS:—The decision of Judge Sawyer, in what is known as the Debris question, which has injured more people than any other decision of any court in the United States if not in the world, during this century, and has, to use a common phrase, wiped out more millions in value of productive property, has been the result of the submission of the most important question to one man, or rather has been the result of the mode of taking testimony before commissioners, so called, who were simple stenographers, appointed to take testimony only. This was done without regard to any ruling upon any question by the judge until it reached (so we are credibly informed) 12,000 pages of all sorts of talk. The judge never saw or heard a witness in the case, refused to hear the testimony read, and never read it himself, but heard long arguments of lawyers, and finally decided the celebrated case of Woodruff vs. the North Bloomfield Gravel Mining Co. et al., without really knowing much about it. Woodruff professed to be a citizen of New York, but before the suit and after it was a citizen of Yuba county, owning land on both sides of the Feather river below Marysville, and some property in Marysville, and therefore had a status in Judge Sawyer's court. Under the orders of this judge, all sorts of loose statements of numerous witnesses were admitted, over one-fourth of which would not have been admitted in any open court, and while it is well known that the plaintiff was not damaged one dollar, yet the judge allowed testimony of a very loose character and acted upon it to prove not only that Mr. Woodruff might some time or other be injured, but extended the scope of the testimony from the Pacific ocean to the head of the Sacramento and San Joaquin rivers, and finally decided, aided by a U. S. district judge brought from Oregon (although there was one here familiar with our State and its laws and customs from the time it became a State), that Mr. Woodruff was so much damaged and was in such great danger of injury that every hydraulic mine in California, and for that matter almost every other mine also must be closed, and that by no possibility could any preventive measures be taken by which the largest gold-producing industry in our State or in the world could continue.

It would be too long a story to recapitulate the serious results of this decision, or of the statements connected with it, or of the practical results of the decision, or of the injury to the miners or want of benefit to any other persons except perhaps to the few whom the miners styled the "anti-debris ring."

The injury is however complete, the hydraulic mines are closed, and almost every other mine can be closed on same ruling. The immense works constructed by the miners are of no value, and fast going to ruin, and no one is in any way benefited. And although the miners have repeatedly stated their ability and willingness to so use their mines as not to commit any real injury, by constructing impounding works, yet our Supreme Judges say no, it is not possible to do it. And this vast industry, which turned out some \$15,000,000 of gold per year, kept many thousands of operators busy, which has turned into the commercial channels of the world some 1200 millions, must forever remain closed, simply because this judge believes, or says he does, that our engineers who can do almost anything, are not able in his opinion to construct works to safely impound debris, although upon our own peninsula and across the bay, one of them is now constructing for a private corporation (the Spring Valley Water Co.) two dams to impound water, either of which are by far much more expensive and important than would be the case to impound all the debris upon any single mining stream in this State.

We have always believed that if one of our engineers, Mr. Schnessler, can impound water by building dams 175 feet high, that there were others who could build dams to impound dirt or debris of equal or greater height; and in this view we are glad to say all the engineers in this State or in the United States concur. But our sapient and wise U. S. judge says in his superior engineering knowledge that it cannot be done, and so this vast industry is extinguished.

We are led to make these preliminary remarks simply because it has quite recently come to our knowledge, through a lawent recently tried in Butte county before Hon. L. D. Freer, wherein it has been shown beyond contradiction that debris can be impounded with entire safety, that it is not such a terrible thing to encounter as our U. S. judge would have us believe. Believing, as we do, that it is certainly within the power of our civil engineers to do it, we now lay before the public a statement showing what one hydraulic mining company is now doing, and also as showing what can be done with mining debris from hydraulic mines.

In Yuba county a mining company called the Spring Valley Gold Co. is operating a hydraulic mine upon a large scale, and, as its predecessor, has done so for many years past, with little or no injury to any one.

Its large mine, which turns out about one-

fourth of a million of dollars every year, is worked by means of 2200 miners' inches of water brought to it from its head reservoir, some 35 or 40 miles across a branch of Feather river in a pipe under 800 feet pressure at its lowest power, and finally used in the mine under 250 feet pressure, using about 700,000 miners' inches of water per year, mining out about 1,500,000 cubic feet of material per year. The material from the mine, after leaving it, passes down a steep ravine or canyon for some two or three miles, until it reaches an open place for depositing debris.

There a large percentage is lodged. After passing this place the water still heavy laden passes to a debris reservoir made by means of a dam called the Lyford dam, and from this it passes into a canal some 20 miles long, which debouches into the Tule basin at mouth of Butte creek. The plain facts brought out by this lawsuit, in evidence given by engineers of the best standing in our State, show that of all the material mined out in this large mine, about ten per cent remains in the mine in the shape of large boulders and coarse material, some 40 to 50 per cent remains in the canyon, and at its foot, of course, gravel, stones and heavy stuff. Some 30 to 40 per cent then lodges behind the Lyford dam, and from five to ten per cent only passes below this dam in shape of silt in suspension, which would find its final rest in the Tule basin, below mouth of canal, if it was not turned out and utilized on its way. The Lyford dam is built of willow-brush; it is now nearly 30 feet high and one-half mile long, and is a live dam. As the willows grow on its lower face, it is a mass of live willows. When it is carried up some 20 or 25 feet more, it will cover with fine sandy debris two square miles, requiring 2,000,000 cubic yards to raise it one foot, and by the time the dam is filled to its contemplated maximum height, the mine will be exhausted. The canal, from the dam to its mouth, is, in its narrowest place, 400 feet wide, built upon the surface of the ground with levees or embankments varying in height from 6 to 8 feet. The levees were originally constructed some 12 years since from the soil of the country, a black adobe, which is the very worst material for such purpose, and for many years great trouble was caused during the rainy season by the breakage of these levees until a system of what is called "sub-levees" was introduced, which can be described as follows: Some 30 or 40 feet or more outside of each main levee, and sometimes inside, another levee was thrown up, and the space between these two has been filled with slickens from the mine, including not only the 10 per cent which passed from the dam in suspension, but other material which was allowed to pass from it also; so that the levees are now considered impregnable as against danger from flood waters. The drainage of about 90 square miles of country flows into this canal, amounting during flood time to about 500,000,000 cubic feet of water per day, while the carrying capacity of the canal is 500,000,000 cubic feet per day up to within a foot of the top of the levees. This so-called slickens, which fills the space between the main and sub-levees, is the best material known for levee purposes, as it packs in between the two very solid, does not crack, and the rodents do not penetrate it far. This canal, which is one of the largest, if not the largest, in this country, being 400 feet wide at its narrowest place and one-half mile at its widest, has a minimum grade of about two feet only per mile, and in high water has a velocity of some three and a half miles per hour, and if the company would permit the material impounded to pass from the Lyford dam, would transport a large quantity through its entire length in flood time and eventually fill the Tule basin below if there was enough of it in the mine, making excellent land of it, instead of being as now a waste of no value.

The company, however, desires to retain the material in the Lyford reservoir, as by the time the mine is exhausted, it will contain some 2½ square miles of the finest soil in the State, worth a large amount of money. The flood water of Dry creek, which now passes over the dam every rainy season, to from 300 to 500 million cubic feet per day, can easily be carried after reservoir is filled around this debris reservoir and turned into the canal below. This debris dam shows practically to the merest novice that our wise Judge must be mistaken in his judicial engineering knowledge, when he says that a debris dam cannot be made to resist the pressure against it in the many rivers, for if there was water behind this dam, now nearly 30 feet high, it would not stand a minute; but as it is simply earth behind it, there is not now, nor will there ever be, any giving out or down stream movement. It is raised now about an average of one foot per year, and it is as staunch and firm as when it was first commenced several years ago, and, in fact, is stronger. These years of practical work upon a large scale show what can be done with debris if brains, and not judicial lore is brought to bear upon the simple problem of impounding earth. It shows that at least 90 per cent, perhaps 95 per cent of debris from hydraulic mines can be impounded and stopped in place, also that the balance, which may be carried in suspension (but even that percentage would depend upon the length of the reservoir behind the dam) can be carried many miles upon a very light grade to any place of final deposit in the Tule basin that may be desirable. For many years this company permitted the farmers owning land adjoining the canal to turn the debris laden water out of the canal upon

their lands (this was before the Lyford dam was constructed and before the inauguration of the system of "sub-levees") for filling up of depressions, until many hundred acres were so filled, which are now the best land in that section of country.

This material which then passed down the canal was much greater in volume than now, as it then amounted to probably 30 or 40 per cent of all mined out, but it now only consists of the finest silt.

If one 10,000 or 15,000 acres of waste land in the Butte creek basin, below the mouth of this canal could be filled with this 30 or 40 per cent, it would certainly be of great benefit and value to the land owners, and the State at large, as what is now a resort for wild fowl would then be a garden spot. That this same result can be arrived at in filling the Sutter basin and the American basin of thousands of acres of now valueless lands with debris from the mines is quite certain. For if debris dams were to be built across the American, the Bear and Yuba rivers so as to raise their beds to a height sufficient to give fall enough to carry the water and silt, or even the heavier material into these basins and eventually fill them, i. e., if there is material enough in the hydraulic mines to do it, the result would certainly be most beneficial to all interests.

What is being done by this one company in transporting debris 30 miles to a final resting place in the Tule, can certainly be done upon a much larger scale upon the rivers named, for in none of them would the difficulty be any greater than is the case with the Spring Valley Gold Co., although it might and would cost a little more money to do it. Suppose, for instance, that a debris dam was constructed across the American river at some convenient suitable point 100 feet high or more. It would simply have the effect to raise the river-bottom that high, giving fall sufficient to carry the mining water (laden with such debris as must pass along the bottom and in suspension) into the American basin. This water would drop its load when it reached there, and after the basin was filled with water it would flow back again into the river nearly or quite clear. The same may be said of each mining river; but so long as our wise judges say debris-impounding dams cannot be maintained in these rivers so long nothing will be done. Stupidity is a fearful obstacle to progress. One of our wise United States judges said from the bench in the Woodruff suit: "If one of these proposed debris dams should, after being built, give way, there is no telling what the consequences would be"—closing this sapient statement by saying, "No one should be obliged to live under such a glacier."

An example and result of this terrible danger was given about 18 months ago in the Lyford dam when from carelessness in the men carrying up the dam, the water, some 500,000,000 cubic feet per day, then passing from Dry creek, was allowed to cut its way through the dam to the bottom, with the fearful result that it simply cut a narrow channel some 300 feet long back from the dam into the reservoir, and some 30 or 40 feet wide at the dam through it, which was repaired a few days afterwards, and no one below was any wiser, or knew anything about it. Had that dam been a water dam impounding water, it would all have gone out. But 500,000,000 cubic feet of impacted earth does not all move at once, or in a brief time as would be the case with impounded water. When the dam at the so-called English reservoir was blown up in June, 1883, over 600,000,000 cubic feet of water went out in an hour. Had it been 600,000,000 cubic feet of debris, it would be there yet.

We invite attention to the operation of the S. V. G. Co., also the results of the debris impounding and transporting arrangements, and we do not hesitate to say that any intelligent person, except perhaps a United States judge, must come to the conclusion that what is being done there, and has been done for a long time past can be done elsewhere, and that so far as impounding mining debris and transporting it to where it will become useful and keeping it out of the mines is concerned, as well as making good land out of waste places with it, the result of the operations of the S. V. Gold Co. show it can certainly be done.

Should the Biggs bill, now before Congress, become a law, which we sincerely trust will be the case, there is little doubt but the engineers who may be appointed to make an exhaustive examination of this debris question will report that "debris dams" can be built and maintained in the mines, although our United States judges say that they cannot. L.

LOS BURROS GOLD MINES.—The San Jose Times has seen a private letter written from the gold mines on the coast of Monterey county to a resident of San Jose. The belief of old miners there is that there will be a number of paying mines in that district. Several have been proved; the Cruikshank mine is paying nicely, rich ore being taken out constantly from a four foot ledge. Another, the Manchester mine, is considered valuable, with a 16 inch ledge showing free gold all through. Good judges think it will be worth \$250 to \$300 per ton. The Ophir, Ajax and other claims have excellent prospects. There is quite a mining settlement in that district. It is reached from the railway stations south of Soledad to San Miguel, through the San Antonio valley and the hamlet of Jolon over a good trail. The average distance from railroad points is about 45 miles.

## Placer County Mines.

EDITORS PRESS:—It is surprising to the mining man who visits Placer county that so little development is going on in a field so rich and promising. Gold-bearing quartz ledges traverse this section in every direction, ledges that with proper development would become paying propositions; but for reasons that will be dealt with further on, are undisturbed, and it is a question at the present time whether the wealth thus locked up will ever flow through the channels of trade.

In days gone by more or less work was performed by poor men on many of the veins to be found in this district, but the cost of machinery at that time was greater than they could stand or the showing would justify. The consequence was that abandonment followed simply because what were then termed "poor grade propositions" could not be worked profitably. Radical changes have taken place since that time, and mines that were non-paying then can be worked profitably to-day. Mining machinery, simple in its character and much cheaper in its construction has been invented, wages are much lower, and transportation rates so reduced that even the poorest grade mines will guarantee a respectable margin over the cost of extracting and milling of the ore. A harrier however exists to-day, one that cannot be broken down by the impetuous prospector, and in coming to Placer county, or at least in many portions of it, to ply his vocation, he finds himself baffled on every hand by agricultural patents that have been plastered over our mineral fields.

How these patents were obtained is a question that those who applied for them and the grantors can answer much more readily than your correspondent. This county is a recognized mineral district, and mining is still going on, and though not now regarded as a leading industry, would soon become active again, and millions of dollars would be taken from the ledges and river channels that are everywhere to be found but for the fact that an agricultural patent covers mineral ground. In nine cases out of ten the working of the mineral land would not interfere a particle with the tilling of the productive lands by which they are surrounded, but there seems to be a bitter feeling among those engaged in agricultural pursuits against the man who mines. They will not work ledges known to exist within their boundary lines and will not permit others to prospect them cognizant of the fact that such work would not interfere with the cultivation of the soil or damage it a particle. Many men who owe their success to the mines have turned their backs upon the industry that laid for them the golden egg, and in some instances have obtained agricultural patents on land that they knew was mineral land, and there is but one way that they could have done so, and that was by perjury or fraud of some description. It is high time that some inquiry was made into this matter and the nefarious practice stopped. If mining men possessed of capital were operating in this county, there is no question but what many such questionable patents would be annulled, but as it is, those who would act in the matter have not the means to bring such a contest to a successful issue. Mining in this portion of our State is receiving more attention than for some years past, and a general revival all along the line is predicted. In the immediate vicinity of Newcastle a ten-stamp mill will be erected this season by the Valentine Bros., on the Hathaway mine, and adjoining properties will also receive their quota of work.

At Ophir more or less prospecting is being done, and it is reported that several good pockets have been encountered. This is, strictly speaking, a pocket camp, and many valuable deposits have been taken from the numerous veins that run through the district. Our prospectors being crowded from this portion of the field by reasons above mentioned, are searching the hills farther back, and it is there that future discoveries will be made. A great amount of prospecting is being done on our river channels, and with the most encouraging results. An Oakland company are operating a channel mine about two miles distant from this place, and though they have only been working a short time, have made discoveries that warrant them in erecting mills to crush the cement. This property was worked to some extent in early days, but water was encountered and in such quantities as to force them to suspend. It is located on patented ground, but the operators, when notified that they could not work the mine in consequence of this fact, informed the patentee that they would do so, and if he desired to test the validity of his patent to take legal measures to stop them. This put an end to the controversy, and if a few more companies of the same sort were operating here the agricultural patent business on recognized mineral land would receive a serious setback.

The Zeracraft mine on the American river is still yielding well, and the grade of ore becoming better as work progresses. The mill is running steadily and produces monthly between \$8000 and \$10,000.

It is reported that a valuable quartz strike was made on the river last week, the ledge on the surface ranging between two and four feet in width, and assaying nearly \$200 per ton. There is no question but what many fine veins will be found along this once fabulous gold-bearing stream. It is a fine field for the prospector, and a few more discoveries will lead to a thorough search of the country in the immedi-



ate neighborhood of the river to its mountain source.

Parties who have just returned from Last Chances, state that the snow has entirely disappeared, and that mine-owners are making preparations to commence work. This is undoubtedly one of the most promising districts in this portion of the State, and the development that will take place this season will be productive of results that will interest mining men. Nearly all the ore taken from the Nimrod and Leopard shows gold visible to the naked eye and the entire ledge from wall to wall will pay to crush. Nine locations have been made on this lode, every one giving good surface returns. Newcastle, Placer Co. MINER.

### Electro Chlorination.

#### Treating Low-Grade Ores.

The Leadville Herald-Democrat has an article on the above subject, from which we extract the following:

The inventor of the process of electro-chlorination is Mr. Henry B. Slater, whose residence for the past two years has been at Detroit, Michigan. Last autumn he succeeded in interesting Mr. William H. Stevens of the Iron Silver Mining Co. in his invention, and for the purpose of securing a practical test of its value Mr. Stevens had shipped from the Iron Silver mine to Detroit some two tons of ore. In making the test nearly the whole of that amount was used.

In order to ascertain, in the event of success, what might be done with a class of ore which has heretofore been practically valueless, a mineral was selected containing 25 per cent of zinc, 20 per cent of iron, 15 per cent of lead and 12 ounces of silver, with (approximately) 28 per cent of silica and 12 per cent of sulphur.

Prof. Alfred DuBois, chemist of the Iron Silver mine, followed the shipment of ore to Detroit, and gave his own personal scrutiny to the entire operation. His report to the company concerning the same is given herewith, and reads as follows:

DETROIT, MICH., March 15, 1888.

Mr. Ashley Pond, President of the Iron Silver Mining Company: At the suggestion of Mr. W. H. Stevens, I make a statement relative to the experiment in treating zinciferous ores by electro-chlorination invented by Mr. Slater. During two months I have watched the process in operation as conducted by the inventor, and have myself verified every portion of the operation. During various brief periods, and especially during the past three days, I have alone conducted it in all its parts, he being entirely excluded therefrom, and not being present at any part of the time. Although I was before convinced there could be no deception, the latter proceeding rendering it quite certain and beyond all question.

I will now state as my conviction that the process is simple, effective and reasonably cheap, as compared with other and older methods of treatment for these ores.

Recent improvements in electro-generating machines has rendered the production of chlorine possible at a very small part of the former cost of this very powerful agent, and upon this depends this process.

The ores to be treated require to be roasted as a preparation, but not of necessity, to what is technically termed a "dead roast." If but partially roasted a point is reached at which an important proportion of the zinc will be converted into a sulphate, soluble in water and precipitable as is the chloride, but it is also available directly for electrolytic deposition of metallic zinc, thus avoiding the use of sulphuric acid for the preparation of the fluid by redissolving precipitated oxide for that purpose.

Or, if more desirable, the sulphate solution may be precipitated as the chloride would be with satisfactory results, except possibly a trace of sulphate of lime may remain in the oxide produced.

If the roasting is prolonged, the proportion of zinc sulphate diminishes and a loss of zinc also will follow in the approach to dead roast.

If the separate use of the sulphate of zinc is desired, it may be filtered out with cold water and the residue may then be chlorinated to complete the extracting of the zinc from the ore. The quantity of chlorine consumed will obviously be diminished by so much as sulphate of zinc is formed, since chlorine can no longer combine therewith.

I am well satisfied with the process, and believe fully it will prove even better in larger practice than in the small way tried here. If any difficulties present themselves they will be of a mechanical nature and will be overcome as soon as their nature is developed. Respectfully yours,

ALFRED DUBOIS.

Colonel S. S. Robinson, manager of the Iron Silver, was also in attendance, in person, upon this Detroit test and was so thoroughly pleased with the result as to recommend its further and more thorough trial in Colorado.

The practical result—or more properly speaking, the financial result—is given below.

In order, however, that it may be more readily understood, we will say that as a preliminary measure (in the practical operation), the mineral will be dressed, removing the lead and gangue—of course, including the silica. Subsequently the lead will be returned and added to the pulp.

It is also proper to say all the estimates of the cost of the treatment, as herewith given, are based upon Leadville prices in every detail—the figures having been furnished by Mr. Stevens.

Value of ore containing 25 per cent zinc, 20 per cent iron, 15 per cent lead and 12 ounces of silver per ton, worked by electro-chlorination process.

Cost of removing zinc per ton of ore... \$5.53

After dressing out the lead and gangue, and removing the zinc, the ton of ore will have been reduced to 753 pounds. The lead that was dressed out can now

be added to it, and we have 753 pounds of pulp plus 347 pounds of lead sulphide, equal 1100 pounds of ore in a condition for smelting equal to a first-class carbonate ore containing all of the lead, silver and iron, of the original ton of ore. But now the percentage of lead has been increased to 27.27 per cent. The cost of smelting will then be, by the schedule, \$5.50 per ton. But we only have 1100 pounds, therefore the smelting charge will be 55 per cent of \$5.50, equal \$3.03.

Total cost of treating for zinc and smelting 1 ton of ore... \$8.56

We get in return 620 pounds of zinc oxide at, say 5 cents per pound, equal \$3.10

Thirty cents per unit for the lead, of which there is 300 pounds... 4.50

And of silver 12 ozs., at N.Y. quotations, less 5 per cent, say 92 cents per oz. net —12 ozs. at 92 cents, equals \$11.04... 11.04

Total value of product... \$46.54

Less cost of production... 8.56

Net value of product at Leadville... \$37.98

If we place the cost of shipping zinc oxide to market at say \$10 per ton or \$20 per ton including packages, we shall have to pay for the 620 pounds of zinc oxide, \$8.20... 6.20

Which shows a net profit per ton of ore... \$31.78

For above grade of ore which heretofore had no value, we shall have for 50 tons per day a profit of... 15.80

And for 300 days in the year... 476.00

It is our impression that the foregoing statement of the cost of treatment by this method is sufficiently clear. That it will require no word of explanation from us. It was prepared by the inventor, himself, and when we say that a similar calculation of the cost was prepared by Mr. Stevens, which reduced the aggregate cost in a material degree, it will be admitted that the estimate here given is intended to be amply conservative. Mining men can readily make their own comparisons with the ordinary cost of smelting any peculiar grade of ore with which they may be familiar.

Now regarding the zinc oxide as an article of commerce: The ordinary domestic article is quoted at about 4½ cents per pound. The product of this method, however, is asserted to be of a much higher grade. In support of this assertion reference is made to Dr. Moore of New York, chemist for the Passaic Zinc Co., who is said to have reported it equal to the best "Paris Red Seal," which is worth ten cents per pound by the carload.

Regarding a further practical test of the Electro-Chlorination process—a test the results of which may be scrutinized by our readers, in person—we are glad to be able to state that a small plant is now in process of erection at the Omaha and Grant smelter, in Denver. It is being erected after instructions furnished by the inventor, Mr. Slater, and under the immediate supervision of Prof. Du Bois. It will have a capacity of eight tons per day, but for the purpose of testing its merits in small lots, but one or two tons per day will be treated.

It will be supplied with zinciferous ores from our own camp.

These experiments will be watched with great interest and we shall take pains to furnish our readers with net results that may be considered as reliable.

Mr. Slater informs us that his estimate of the cost of a plant—erected at this point—with a capacity of 50 tons per day, would be \$100,000. This would include the cost of seven dynamos, each having a nominal daily capacity of eight tons of zinciferous ore.

### A Temperance Mining Camp.

A temperance mining camp in Arizona, or any other mining country of the Great West, is somewhat of a great novelty, yet that is what they propose to have at Cooper Basin, as will be seen by the following, which is a copy of a notice posted up prominently in the camp:

#### Notice.

Desiring to have at the Basin a moral and respectable camp, the Copper Basin Copper Company establish the following rules for the benefit of their employees:

Profane or other improper language will not be allowed.

Intoxication prohibited, although no restraint is imposed on the temperate use of liquor.

Gambling in any form prohibited, although no objection to the use of cards, chess, checkers or dominoes.

The patronizing of any liquor saloon, gambling-house or any other place of bad repute by any of the employees of the company is prohibited.

The violation of any of the above rules will subject the offender to immediate discharge.

Any employee of the company unable or unwilling to comply with the above regulations will please call at once at the office for settlement of his account.

COPPER BASIN COPPER CO.,

By J. J. WILLIAMS, Supt.

Copper Basin, Arizona.

As a clincher to the above, all employees of the company are required to subscribe to the following pledge:

We, the undersigned employees of, doing business for the Copper Basin Copper Co., do hereby subscribe to the rules and regulations of the camp, and pledge ourselves to refrain from the use of profane or improper language, from gambling, from immoderate use of liquors, and agree not to patronize any liquor saloon, gambling-house, or any place of ill repute while in the employ of the company.—*Journal Miner.*

ACTIVE preparations are going on for celebrating the 4th of July in this city.

### The Expression of Our Movements.

(Continued from Issue of June 16th)

(Translated for the Press from the French by M. N. M.)

#### The Pantomime.

The literal sense of the word pantomime is, a total imitation; that is to say, that everything in it is represented by imitation. It is figurative language. Pantomime in this sense differs completely from what is called the language of signs, because signs are movements purely conventional, of which we make use in order to replace letters or ideas, while pantomime consists in the reproduction, as exact as possible, of the expressive movements, just as nature produces them under the influence of such or such sentiment. The expressive effect of this kind of movement is so true, so evident to all eyes, that pantomime has become an art, either alone or mixed with the dance, and is composed of representations in which, notwithstanding the speechlessness of the actors, the interest and the pleasure are at times as intense as in a spoken piece.

Taken as a spectacle or as figurative language, pantomime is from the point of view of the art of physiognomy, the most important and the most interesting of the expressive actions, for the reason that, being applicable to all states and sentiments of the mind, it forms a dictionary of ideas as complete as that of the spoken language. To try to analyze here the expressive movements would be to again go over all the work that we have done, the precise object of which is the expressive movements; we will then only refer to what we have said, remarking, however, that if our observations are just, we should see them verified in all pantomimes, whether natural or theatrical.

#### The Pantomime

Makes an integral part of every ballet; it also blends in great proportion with the properly called dance, not only in the theater, but likewise in the greater part of the character dances, in which the look, smile, gesture, and the movements of the body are continually in action to express the various sentiments of the mind. Apart from some errors of false taste or some symbolical movements of which the origin and sometimes the sense are unknown, the signs are the same as in nature, and the more natural the signs, the truer will be the pantomime. Nevertheless, for the reason that art would cease if it were limited purely and simply to a strict imitation of nature, pantomime has become a spectacle which not only adds to the physical reproductions, some expressive movements (the talent, soul, sentiment of the artist, that indefinable power which takes truth and represents it without in any manner obviating it from that which every one recognizes at a glance), but gives, moreover, an evidence, an eloquence, and an intensity, which that truth has not in nature.

The nature of the pantomime requires, too, an expression much more intense in the movements, since it is necessary to produce by these movements alone, what they ordinarily express by their conjunction with speech, so that here the accessory must perform the role of the principal.

#### The Expressive Action

In it is likewise much more accentuated, and if the actor is not very capable he easily falls into exaggeration. This moderation is difficult to maintain, and it gives, it may be said, *en passant*, the reason of the ridicule which attaches to certain actors who, in spoken roles, abandon themselves to a pantomime as energetic as if it were a dumb role they were mimicking. We must never lose from sight that, with the man who speaks, the mimique is only an accompaniment of speech, and that the latter must be so subdued as never to dominate the former. The silent pantomime, when it is executed with talent, presents to us a visible and moving picture which attains effects more extraordinary than those of speech.

In the ballets, the congruities and necessities of the description take much of the power from the pantomime and imposes on it many modifications. The obligation of following the musical measure, the conditions of duration or development of the steps and attitudes, and also the traditions or personal inspirations of the dancers, introduce many elements foreign to the natural mimique.

#### It is in the Pure Pantomime

That we must observe this great medium of expression. The ancients in their immense theaters had carried the pantomime to a high degree of perfection. Unfortunately, as in the dance, it is transmitted but in tradition, and teaching only by imitation, has left no written documents by which to reproduce it, nor any other trace than the appreciation of contemporaries. We can rest assured that the same means of expression have been employed at all times to express the same sentiments, but there is in the mimique one part, of conventional signs, which must have varied according to the times, but about which we can know nothing positively. The presumption is that the present mimique of our theaters had its origin in Italy (the Italians having probably received it from the Romans and Greeks) and we our pantomime through that intermediary. Be that as it may, it is certain that the pantomime, whether natural or theatrical, is in very strict analogical relation with the language of each people, that is to say, it has the principal char-

acteristics. It is clear, analytic, sober, with the French; lively, colored, exaggerated, with the Italian.

#### We Have Seen at Paris.

Negroes from Africa, savages, who, with the contortions and grimaces of persons possessed, showed us pantomimes as savage as themselves. But the most extraordinary of this kind are the English mimics. I must admit that no spectacle in the world impresses me as much as their setting, and when I see the laughter almost apopleptic which they excite at each instant in the house, I think my personal impression has nothing of exaggeration. With blows, falls, leaps and grimaces, these people cause 2000 or 3000 persons to shake all over and explode their laughter. And it is not only in the burlesque that they produce such effects. At the moment in which we least expect it, without transition and without reason, that frightful gaiety suddenly ceases and the same actors (become specters) perform some lugubrious scenes; it is the delirium of horror, which frightens us and which freezes us to the marrow.

The genius of the English people is complete, rugged, energetic, sharp and cold as steel, somber as the tempest or death, profoundly human; Shakespeare, in short, who will always remain as the most astonishing incarnation of a nation in a man.

#### In Order to Give an Idea

Of the power of expression that an intelligent man can receive from the pantomime, I will relate a fact which one of my friends witnessed. In a city of the province in which he sojourned for some time, he met a man who there occupied an important position, and who, while a student at Paris, had frequently associated with artists and comedians. He had learned many scenes of divers kinds, and among others he performed this one. He seated himself and appeared to fall into a reverie; then, like a man who summons up some agreeable souvenirs, he smiled at first vaguely; by degrees his figure expanded, his laugh developed, augmented, and at last burst forth with so much force, that all the by-standers laughed extravagantly. In an instant he stopped as if a different idea had come to disturb his merriment. His countenance became serious, his respiration abrupt, and difficult; sobs, restrained at first, caught his breath to heave. He raised his hand to his brow, caught hold of his hair, and threw back his head; then a hurst of supreme despair, a cry and a flood of tears came at once, and this mute picture was so harrowing that every one was compelled to weep also. And yet he had not spoken a word.

#### In Another Description

I am able to give an account of an experience personal to myself. I reached home all upset at having seen in the street one of those scenes which misery presents us, alas! too often, but the object that I saw had in it something poignant; it was only a pantomime, but what a pantomime! A woman was kneeling, seated upon her heels. Beside her, two small children, a boy and a girl, reclined against each other, who, with lowered heads, glanced at me sideways, like little savages, and here is what pierced the heart like the thrust of a lance. The mother, with head thrown back, extended arms, and outstretched palms, neither spoke nor moved. It was distress, despair, in a posture of distracted affliction, and she seemed to say: "Behold, I am blind; I have two children to support; it is not enough to implore alms with one hand, I extend to you both!" I do not remember any drama or even tragedy that has disturbed me like that scene, like that gesture, and yet that sightless person differed from others only by the two outstretched arms and open palms.

The tragedians likewise make gestures of this kind, much more violent, much more pathetic and the tenors of the opera have a mimic still more barrowing; but the making of the gestures is not everything, they must be made to the purpose. That woman made her gestures *apropos*, and they were indeed impressive.

A VOTING MACHINE.—A system of automatically taking and recording votes at elections has been invented and patented by John W. Rhines of St. Paul. Printed tickets are done away with altogether, each voter recording his vote by means of a machine. The machine consists of a box in which a series of keys are used to print numbers upon endless slips of paper running upon rollers. The keys run crosswise in rows on the lid of the box, each row representing a candidate, while each key signifies one of the competing parties. The voter raises a cover over the lid of the box and presses the keys marked with the names of the candidates he votes for and the party to which he belongs, by this means printing numbers upon the slip inside the closed box. He then closes the lid of the box, covering up the keys. Repeating is impossible without detection, as the keys stay down until the lid of the box is again raised, when a ratchet releases the keys, leaving them ready for use again, and at the same moment striking a gong. It would be necessary for the authorities to publish the whole plan of the arrangement of the keys of the machine, together with the allotment of the candidates and parties to the keys, so that all voters may become acquainted with the arrangement. The cost is said to be below that of other vote-recording machines. A company has been formed to handle the machines, and it will be known as the Rhines Ballot System Company.





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SAN FRANCISCO  
Saturday Morning, June 30, 1888.

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## Passing Events.

The formal transfer of the Lick Observatory to the Regents of the State University was made this week by the Lick Trustees, and now the scientific work with the big telescope and appliances will commence.

Further purchases by English capitalists near Aurora, Nevada, will be a good thing for that whole region. Large reduction works are to be put up immediately, which will give the miners a chance to work the ores.

Gold lode and placer mining is greatly on the increase in Colorado. The latter branch of mining has long been neglected there, but of late more attention has been paid to it.

The MINING AND SCIENTIFIC PRESS this week closes the volume. It is as well to remind readers that this is a good time to renew subscriptions, so as to commence with a new volume.

During the coming week the national holiday will be observed. On this occasion the monument to Francis Scott Key, who wrote "The Star Spangled Banner," will be unveiled in Golden Gate Park, where it has been placed by the Lick Trustees in obedience to the desires of the late James Lick.

ELECTRIC LIGHTS, railroads and steam launches are now being used by the Chinese while repairing the Yellow River breach, in Honan.

## Close of the Volume.

This is the last number of volume LV of the MINING AND SCIENTIFIC PRESS. On the last pages will be found this index, a glance at which will show how wide a range of subjects has been considered during the past six months. The PRESS has for many years been a weekly visitor in the mining camps and towns of this coast. Devoted, as it is, mainly to the mining industry, it is deserving of the support of all who have an interest in mining matters. It is not too much to ask our friends who have been subscribers for years to call the attention of others to the advantages to be derived from reading the PRESS. People who are engaged in mining or metallurgy cannot well afford to be without a journal which obtains from all sources information of value and interest to them. The older mining communities know the paper well, but among the newcomers to the coast of late there are doubtless many who would become regular readers if those familiar with it should call attention to the matter. With a larger subscription list, our sphere of usefulness is enlarged.

## Coal Product of 1887.

In the United States the total production of all kinds of commercial coal was 123,965,255 short tons (increase over 1886, 16,283,046 tons), valued at the mines at \$173,530,996 (increase, \$26,418,241). This may be divided into Pennsylvania anthracite, 39,506,255 short tons (increase, 2,809,780 short tons), or 35,273,442 long tons (increase, 2,508,732 long tons), valued at \$79,365,244 (increase, \$7,807,118); all other coals, including bituminous, brown coal, lignite, small lots of anthracite produced in Colorado and Arkansas, and 6000 tons of graphitic coal mined in Rhode Island, amounting in the aggregate to 84,459,000 short tons (increase, 13,473,266 tons), valued at \$94,165,752 (increase, \$18,611,123).

The colliery consumption at the individual mines varies from nothing to eight per cent of the total output of the mines, being greatest at special Pennsylvania anthracite mines and lowest at those bituminous mines where the coal-bed lies nearly horizontal and where no steam-power or ventilating furnaces are used. The averages for the different States vary from 2.10 to 6.17 per cent.

The total output of the mines, including colliery consumption, was: Pennsylvania anthracite, 37,578,747 long tons (increase over 1886, 2,725,670 long tons), or 42,088,197 short tons (increase, 3,052,751 short tons); all other coals, 87,837,360 short tons (increase, 14,129,403 tons), making the total output of all coals from mines in the United States, exclusive of slack coal thrown on the dumps, 129,925,557 short tons (increase, 17,182,154 tons), valued as follows: Anthracite, \$84,552,181 (increase, \$8,443,661); bituminous, \$97,939,656 (increase, \$19,458,600); total value, \$182,491,837 (increase, \$27,891,661). The above figures show a notable increase in 1887 over 1886 in the aggregate output and value of both anthracite and bituminous coal.

For these figures we are indebted to Chas. A. Ashburner, who has collected them for the U. S. Geological Survey (Department of Mineral Statistics).

The total production and the spot value in each State and Territory, exclusive of colliery consumption, are shown in the following table:

States and Territories.	Quantity.	Value at Mines.
Pennsylvania:	Short tons.	
Anthracite.....	39,506,255	\$79,365,244
Bituminous.....	30,866,602	27,809,941
Ohio.....	10,361,708	9,098,848
Illinois.....	10,278,890	11,152,596
West Virginia.....	4,836,820	4,594,979
Iowa.....	4,473,828	5,991,735
Maryland.....	3,278,023	3,114,122
Indiana.....	3,217,711	4,324,604
Missouri.....	3,209,916	4,295,394
Kentucky.....	1,809,185	2,229,163
Alabama.....	1,900,000	2,470,000
Tennessee.....	1,900,000	2,470,000
Colorado.....	1,791,735	3,941,817
Kansas.....	1,506,879	2,236,631
Wyoming.....	1,170,313	3,510,934
Virginia.....	825,263	773,360
Washington Territory.....	772,612	1,639,745
Indian Territory.....	685,911	1,298,624
New Mexico.....	508,084	1,524,102
Georgia.....	313,715	470,573
Utah Territory.....	180,621	360,402
Arkansas.....	150,000	252,500
Texas.....	75,000	150,000
Michigan.....	71,461	107,191
California.....	50,000	150,000
Oregon.....	31,690	70,000
Dakota.....	21,470	32,205
Montana.....	10,202	35,707
Rhode Island.....	6,000	16,250
Nebraska.....	1,500	3,000
Idaho.....	500	2,000
Total.....	123,965,255	\$173,530,996

## Proceedings in Chancery.

The business of closing the hydraulic mines by injunction and of imposing fines on parties guilty of violating such decree still goes on. In considering these proceedings, carried on and consummated without the intervention of a jury, the unprofessional mind is greatly puzzled to reconcile the same with that clause of our Constitution which declares that "the right of trial by jury shall be secured to all and remain forever inviolate." Aside from all consideration of the merits of the controversy, it is a fact that within the past ten years property to the value of fifty million dollars or more has been virtually confiscated in this State, and yet no jury has ever been permitted to pass on the merits of a single case, nor have the defendants been suffered to appear with their witnesses before the judges who issue these injunctions. The testimony is taken by a commissioner and afterwards submitted to the judge, who considers and passes on the evidence, neither of the parties, complainant nor defendant, ever appearing in the judicial presence.

This one man in the seclusion of his "chambers" having looked over the testimony and come to a conclusion, issues his mandate, which is forthwith carried into effect. It is true his decision may, on appeal to a higher court, be confirmed or reversed, but no where, from the time the complaint is filed till the case is finally adjudicated does a jury appear as a factor in the proceedings.

We are told that these being cases in equity belong to chancery jurisdiction, there being no suitable or sufficient remedy provided for them by law. That is no doubt so; and far be it from us to question the wisdom of this anomalous arrangement, for which there is presumably a good reason. We are only speaking of the way the thing impresses the unclerical, non-judicial sense, and wondering where the Constitutional provision quoted comes in! As the judge may dispose of the case without the interposition of a jury, so may he fine the delinquent in such sum as he sees fit. The penalty imposed may be a hundred, a thousand, or for that matter, we suppose, a million dollars, perpetual incarceration in the county jail being the alternative of its non payment.

For the damage done of a night by a single swine, the owner of the hog, if sued, may demand to have such damage assessed by a jury of his countrymen, yet in the case of the hydraulic miners vast and profitably productive operations may be suddenly arrested and valuable estates with all their costly plant be rendered utterly worthless on the dictum of a man who never saw the property or its owners, and who from personal inspection knows nothing about the extent of the injury complained of.

It is considerations like these that so stagger the layman when he comes to wrestle with this strange proposition. To the legally illiterate, that is, the man little conversant with the mysteries and logic of the law, this seems incomprehensible and past finding out. But, as before remarked, there must be good reasons for it, albeit they are to the ignorant a stumbling-block and to the laity foolishness.

To the man educated to the profession the law seems, what the great English commentator calls it, "the perfection of human reason." To the heightened outsider it seems full of defects, quirks and inconsistencies, the which are made manifest in nothing more than this ignoring of trial by jury, an institution lauded as one of the great safeguards against judicial tyranny and the encroachments of official power, and for the preservation of which the advocates of popular rights have in times past made the extreme sacrifices, even to the surrendering up of life itself. To this same outsider that seems also an unreasonably broad discretion which admits the imposition of penalties without limit and not specially provided for by law, making the punitive power of the judiciary all but omnipotent. But then these reflections may be born out of wisdom but of ignorance. We can only say they seem to be naturally suggested by the subject.

T. A. FROSHFIELD, an ex-mining commissioner for the district of Cornwall, England, accompanied by Mr. Dawling, a mining expert, is in San Francisco, en route for Alaska. It is the purpose of Mr. Froshfield to examine a number of mining properties in the Territory in the interest of a number of foreign capitalists.

## The Cumulative and Staying Industries of California.

It has been well remarked that the industrial gains made in California have all been cumulative—the building up of new pursuits having never been at the expense of those previously established. There has been found need and room for all. If land culture has been developed here at a wonderful rate it has not worked any detriment to mining or other vital interests; nothing has been neglected or retarded because increased attention has been paid to some new branch of business. All that had the least chance to gain a permanent foothold have lived and thrived at least moderately well, many having forged ahead at a most astonishing rate.

At the start mining was the only largely productive industry in the State. We had agricultural resources of a high order, but we were then ignorant of their existences. As the placers became impoverished, we were forced to look about for something else to do. Timidly and in a small way our people began to cultivate the soil, experimenting at first with wheat-raising, which speedily grew into a great and prosperous industry. Then came dairying, wool, fruit and grape-growing, all engaged in with like distrust, but since reaching a great expansion. In due time various manufacturing branches were undertaken, and generally with the same good results, much better, indeed, than were usually anticipated by the public at large.

We look back and recall how common was the opinion that these earlier efforts to plant new industries in California were wholly premature. It was in this light that the founding of our woolen and rolling-mills, our cordage, wire and lead-pipe works, and many similar branches of business, were generally regarded. With capital, labor and the raw material so dear, and the home markets so limited, their failure seemed inevitable. And it must be confessed that they had a hard struggle at first. But these early struggles survived, the most of these pursuits have since reached large proportions and proved fairly profitable.

Where these now prosperous and well-established industries once stood, others, such as the manufacture of cotton, jute, carpets, oil-cloth, etc., stand at present, fighting for a foothold with a dubious future before them. That they will, like their predecessors, survive these struggles and eventually prove paying ventures, is more than probable. That they will do so let us hope and thus further enlarge this grand California structure so made up of cumulative industries.

Looking about and comparing the industrial condition of California with that of her neighbors she is found to occupy the first rank as a wine, wheat and gold-producing State, being only second as a producer of fruit, wool, barley, hops, and several other agricultural staples.

Contemplating the situation we are led to inquire, what next? In what direction will be our next advances, and what our next new element of wealth? To our mind, California's special wants and opportunities consist now of increased population, manufactures, and gold mining. There is need for more people and room for them, too; so also of manufactures, but, above all, there is both room and necessity for more gold mining. Here is the one business that instead of etanding in the way of others helps them all. It aids and encourages every other, but competes with none.

Looking at our auriferous resources there seems room for nearly as great expansion here as in the field of agriculture. As regards the area of land available for tillage we know its extent and value. But this cannot be said of our mineral domain, or the wealth it contains. We know this wealth is large, but how large cannot be ascertained in advance of exploration. That we can maintain our present output of gold for centuries is certain. That it can be largely increased is probable, but how much remains a matter of conjecture. There is reason to believe that it will within the next 50 years be doubled—it may be quadrupled. Up to a certain limit there is among all our domestic products none so certain as that of gold, an assurance that ought to beget great confidence in the future of this business, than which none is likely to prove more permanent or more profitable. As it came first, it is the one of all our industries that has come to stay.



**The Belmont Mine Accident.**

On Monday last about 1 P. M. a fire broke out in the hoisting works of the Belmont mine, near Ophir, Placer county. Three men, James and William Reardon, brothers, and Joseph Hawkins, were at work in a drift 100 feet from the surface at the time, and were unable to make their escape. The alarm spread rapidly, and crowds from Auburn, Newcastle and Ophir thronged to the scene. The flames were soon extinguished and the work of rescuing the imprisoned miners was commenced.

A set of men, of whom Andrew Larsen was one, first attempted a descent of the shaft but were driven back by the foul air, almost overpowered. Then a second attempt was made to reach the men 100 feet below the surface, and

the mine, and frequently the miners there had been warned against such a practice.

THE MONTE CRISTO MILL at Minersville, Utah, has been running off and on this last two months on low-grade ore, producing hullion, and is working now on custom ores. At the Monte Cristo mine, in crosscutting 135 feet in the tunnel, they found a five-inch seam of quartz assaying  $4\frac{1}{2}$  ounces gold and three ounces silver. They also struck into a cave of quartz ore carrying some silver; have not got to hanging-wall yet. The mines in Star district are being worked slowly by chlorides, and the higher grade lead ores are shipped to Salt Lake for sale.

OVER in Australia they value the Broken Hill mine at \$50,000,000 and the Mt. Morgan mine

**Foundry Notes.**

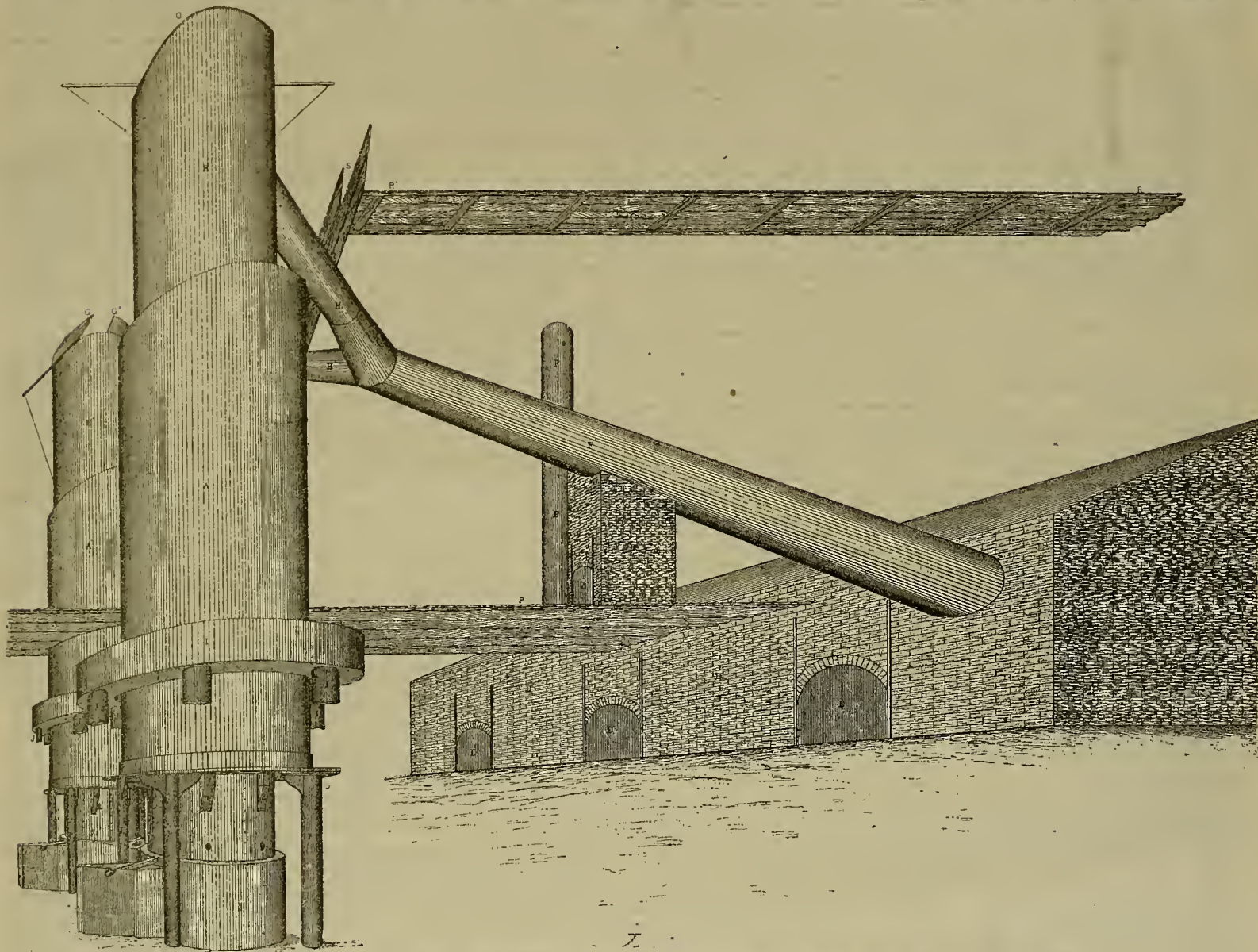
All the contracts at the Savage Foundry will be completed, and the creditors will then determine what is to be done with the plant. The failure will throw a number of men out of work. The Dodge pulverizers, crushers and concentrators were all made at this foundry for Parke & Lacy.

The Fulton Iron Works continue to manufacture marine engines for coasting vessels, having obtained the hulk of this work.

The cruiser Charleston will not be launched on the 4th of July, as had been anticipated, but she will be completed ready for launching in a few weeks. The Union Iron Works have a great deal of marine work on hand, in addition to this cruiser. Their dry-dock has been a good

**Dust Chambers.**

We recently described in the PRESS the circular smelting furnaces at Leadville, Colorado. In this number we give a sketch of the dust chamber arrangement. On the feeding floor is a large wooden trough in which the roasted flue dust is mixed with about 20 per cent of milk of lime. The mixture is then spread over the ore beds placed on the floor. Immediately outside the main building, on the feeding-floor level, are the flues connecting the stack of the furnaces with the dust chamber; this arrangement at smelter A is the only one of its kind in Leadville. The upper part of the stacks *EE'* of the furnaces *A A'* are connected by means of the sheet iron flues *HH'* with a main sheet iron flue *F'*, which enters the brickdust



PERSPECTIVE VIEW OF DUST CHAMBER AND ARRANGEMENT OF FLUES FOR COLLECTING FLUE DUST.

again did Larsen volunteer his services. Slowly they were lowered down into the shaft, but the noxious gases were more than human beings could stand, and once more was the little hand of heroes drawn back to the surface. But Larsen who had twice made the descent was dead when the cage reached the surface. Chris. Linde, J. Weick, Al. Armbruster and several others were almost overpowered by the foul air, narrowly escaping with their lives.

Nothing daunted, however, the work of rescue was continued, and finally a party of five descended the shaft and penetrated to the drift where the imprisoned men had taken refuge. The bodies were found in the drift about 40 feet from the shaft. The shaft is 100 feet deep. Death was from asphyxiation. The miners must have lived at least three hours after the fire broke out, as at that time a steel rope that was hot was let down into the mine and one of the men was found with his hand burned as if he had grasped the rope. A blast was fired in the mine after the fire broke out on top. The fire originated through carelessness, for the man who ought to have remained on top quit his post and went down into the mine to work. To do that way was a habit at

at the same figure. American silver miners are in demand. A gentleman recently from Melbourne says: "The inducements for good practical miners competent to take charge of mines in Australia are very great, and competent men can command yearly salaries ranging from \$2500 to \$5000. Australians do not understand silver mining very well, and are anxious to have experienced American miners go to the colonies."

THE STEWART MINING BILL.—We have received several inquiries concerning this bill, and have written to Senator Stewart for details. It is not probable, however, that final action will be taken at this session of Congress. The laws will remain as before, for this year at any rate.

THERE are two mills now crushing ore from the Lang Syne mine, at Dun Glen, Nevada, and reducing 45 tons daily. The owners have put rock-breakers and elevators in place, and work the ore at the least possible expense.

DURING the last lease of the Divoll mine, Tuolumne county, nearly \$150,000 was taken out. This is a famous pocket mine, and the owner, J. G. Divoll, will now work it himself.

investment and is constantly in demand.

On Tuesday last six workmen were injured by the flowing over of a mold of molten lead at the Empire Foundry, at 135 Fremont street. Four of the men luckily escaped with slight burns of the hands, while the others had their feet and hands burned.

A fire this week did some damage to the brass works of Weed & Kingwell and the Columbus Machine Works. Royland's Brass Foundry was also burned out.

TRANSFER OF THE LICK OBSERVATORY.—The Lick Astronomical Department of the University of California is now completely organized. The formal transfer took place this week at Berkeley, when the Lick Trustees turned the observatory over to the Regents of the University. E. M. Mastick, on behalf of the Lick Trustees, addressed the Regents, and Prof. Joseph Le Conte replied for the Regents.

THE 40-stamps of the Nevada mill, crushing Chollar and Potosi ores, are driven by a Pelton water-wheel.

SOME of the richest pay gravel ever handled in Smartsville is coming out of the Blue Point.

chambers *D'*. Each of the flues *HH'* is provided with one, and flue *F'* with three sliding doors placed on the upper part of the flues and parallel with them, and used for clearing the dust which accumulates periodically in the flues.

The flue *F'* rests about half way on a small flue dust chamber *N*, made of bricks and provided with a sliding door *d*, for the extraction of the flue dust. Immediately at the rear of the dust chamber *D'* are long rows of ore-hins, and immediately behind them is a large roasting furnace. The level immediately above and at rear of the roasting furnace, is the fuel level which communicates with the blast furnaces by means of an elevated platform *R'*, provided with a track of rails. The fuel charged on light sheet iron mining harrows is thrown down next to the feed holes along the chutes *S*. This saves much labor; two fuel men are sufficient to supply all the fuel needed in smelting, but its great inconvenience is that of filling the whole feeding floor with a cloud of charcoal dust. The engraving, which we take from Emmon's "Geology and Mining Industry of Leadville," shows in perspective the general disposition of the dust chamber and connection,



## MINING SUMMARY.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

## CALIFORNIA.

## Amador.

**PLYMOUTH.**—Cor. Amador Ledger, June 23: The mining outlook is dull at this time, there being no mine work going on except at the New London, which continues sinking. There is strong talk of a mill being erected on this mine this summer, as there is an abundance of good ore, but so far we hear of no preparations for the building of the mill. The Plymouth Consolidated looks as dead as ever, and there is no rumor of starting it up at all, but it may start some time for all that.

**MISCELLANEOUS.**—The superintendent of the Sutter creek mine reports as follows: For the week ending June 16, this company has extracted 70 tons ore, and milled the same. Crosscut No. 2 advanced 15 feet, crossing several rich strata of quartz. At present mill is running steadily. A. P. Minear returned from San Francisco Wednesday evening. It is reported that he has secured a mill site on the Amador Queen ground, and is negotiating for a right-of-way over the Doyle claim. The Dine mine, near Volcano, has been started up by N. G. Young. A. J. Sargent struck a small pocket on his claim at Middle Bar last week, from which he took out \$500 in a short time.

**FROM DRYTOWN.**—Cor. Amador Ledger, June 23: There has been some change in the mining outlook since my last letter. The Cosmopolitan is looking well, and sinking is progressing very rapidly. The Gover is looking fine, and considerable improvements are being made around the mine and mill, and several new buildings are being erected in the town of New Chicago. The Potosi mine will start up again next Monday. An English company from below are here making every necessary arrangement to open up the mine. It is their intention to put in a new boiler and clean out the old shaft and re-timber, and other necessary improvements. The Loyal mill is kept running steadily on rock taken from the mine.

## Inyo.

**DEEP SPRING.**—Inyo Independent, June 23: Sam Piper is at work on a gold-bearing ledge north of Cottonwood creek. Turner and his partner quit work on their silver ledge about ten days ago. They sunk 200 feet on the ledge and at that depth it was as "barren as a hound's tooth," so says the reporter. Nothing new in the district had been struck at last report.

## Nevada.

**VERY RICH STRIKE.**—Tidings, June 20: Last evening the W. Y. O. D. mine boys made a very rich strike at a point 225 feet from surface and 130 feet from the shaft. The ledge is strongly defined and is three feet thick. Gold in sheets half an inch thick runs through it, and the ore throughout is "peppered" with the precious metal. To-day several sacksful of the rich quartz was taken out. Everybody who knows of the strike is rejoicing with the plucky young owners of the property. The suit for foreclosure of mortgage will be dismissed, Weissbein Bros. having purchased the obligations and extended time for payment. Sinking in the shaft is going ahead steadily.

**THE JUNCTION.**—The Junction claim is situated about two miles from San Juan and on the westerly side of the North Yuba river, near its junction with the Middle Yuba; hence the name "Junction." It was located about two years since by Frank N. Morris and G. N. L. Powell. These gentlemen obtained encouraging results from the prospecting they did upon it, but want of funds to develop the property caused them to look around for energetic and thinking men with whom to associate themselves and form a company to open up the mine in a systematic manner and work it on strictly business principles.

**THE GOLCONDA.**—Herald, June 20: The ledge formerly known as the "P. P." afterwards as the Egyptian King, but now as the Golconda, will soon be attracting attention. It lies just to the east and parallel with the El Dorado. George E. Hothersall and George Riley are part owners and are going to spend their vacation developing the ledge. Mr. Hothersall went over to Columbia Hill to-day, we believe, and next week will start operations. The ledge looks well and rock from it has been crushed which yielded \$4.75 per ton near the surface.

**MINING SALE CONSUMMATED.**—Tidings, June 20: Developments bear out statements made by the Tidings recently in connection with the sale of the Pittsburg mine. The sale was not consummated until last Thursday, when transfer was made to the English company and the first installment of the purchase price received. The new company have a representative here, Mr. Elliott by name, and he is instructed to put underground work. First, however, a Pelton wheel for hoisting purposes is to be put in, and the landing raised to make space for depositing waste rock. Trails are to be laid in the shaft, and then sinking will be in order. When ore in quantity and of quality warranting the reconstruction of a 10-stamp mill, and the addition of 10 stamps shall be found, such work will be done, and not before. The mining sharps of our unreliable Nevada City contemporaries to the contrary notwithstanding, no contract for a 20-stamp mill has been made. The new company's business office will be at Grass Valley, and from this city supplies will be drawn; \$50,000 will be spent in developing the property.

**GRAVEL.**—North San Juan Times, June 22: Archer & McIntyre of this place are the owners of a gravel claim about two miles from town which affords an example of what may be accomplished by men possessing industry and perseverance. The locality of this claim is familiarly known as Jersey's Slide, and the above-named gentlemen commenced work thereon four years ago. During the first 18 months they met with poor success, in that time taking out but \$40. Nothing daunted, operations were continued and about two years since the mine was put on a paying basis and has remained there. The gravel channel is 135 feet wide and is worked through a tunnel 200 feet in length. The earth's looseness permits the working of only half the channel's width at a time, necessitating two drifts to breast out a piece of ground the width of the gravel channel and about 65 feet in length. When one

side of the main tunnel is worked out in this manner, the other side is treated likewise, and then a new tunnel is driven and the same drifting and breasting tactics repeated. Archer & McIntyre employ four men, which, with themselves, make up their crew. Two shifts are worked and the output of gravel in 24 hours is about 30 carloads, which is placed on a dump until enough has accumulated to warrant a run, when the dump is washed by means of sluices. This claim pays, on an average, \$800 to \$1000 in dividends monthly. The expense of working is comparatively light, as timber is plentiful in the neighborhood and as the mine's owners have their own reservoirs, ditches and water supply.

**THE MOUNTAINEER MINE.**—Transcript, June 20: It was reported some time ago and generally believed, that the Mountaineer mine near this city had closed down. The report is false. Operations are going right along as usual. There was a portion of the force let off at the time the rumor was current because all could not just then be economically worked, and that was all the foundation for the story. The Mountaineer has paid pretty good dividends, and will do it again.

**RICH ROCK FROM THE OMAHA.**—Grass Valley Union, June 20: Within the past two days some splendid quartz has been taken out of the Omaha on the south drift of the 600 level. It shows as richly in gold as any quartz found in the district in years, the gold being coarse and well distributed through the solid rock. The specimens brought to town have been much admired and commented upon as being among the finest ever seen here. The ledge from which these specimens came is strong in width and solid, and is a certain indication of the presence of a good pay-shoot. Fine milling rock is also being taken out of the north drift of the 600 level, which makes the outlook for the mine very encouraging.

## Placer.

**THE HATHAWAY MINE.**—Newcastle News, June 23: Early in the fifties a great amount of work was performed on what is now known as the Hathaway Mine, and a wooden stamp mill, the only kind then in use, was erected, and from what can be learned of the early history of the mine it was a paying property. The ledge, however, was what miners term "surface robbed," no effort being made to develop it to any depth. After many set-backs and repeated changes of ownership, it eventually became the property of James Butts, who has worked it off and on for ten or twelve years past, and crushed the ore in a five-stamp mill planted near the mine. Recently the Valentine Brothers, of San Francisco, secured a working bond on the property with the privilege of purchasing it provided explorations resulted satisfactorily. So far as this work has progressed very gratifying results have followed, and it is now deemed absolutely certain that the mine will again change hands and will be worked for all its worth. The ledge is strong and well defined, ranging in width from four to seven feet, and is what is known as a continuous ore body. The walls are perfect, being hard, smooth and regular, and it is said that the entire ledge from wall to wall will pay to work. Although carrying free gold in paying quantities, rich sulphurets are also generously distributed through the rock, all of which gives high assays in gold and silver. The ore will be worked for the free gold by a common stamp process, and concentrators will be employed to save the base metal. This will be shipped to chlorination works for reduction. Mr. Frank Guerra, a practical mining man is superintendent. A boarding and lodging house have been erected, and both will soon be ready for occupancy. A ten-stamp mill has been purchased, which will be put up as rapidly as circumstances will permit. The mill and hoisting works will both be run by water-power and the ledge being large the ore can be extracted and worked at a comparatively low figure. A main working double-compartment shaft is being driven on the ledge, a work that will be pushed until it reaches a depth of 100 feet below the tunnel level, and from which extensive explorations will be made.

## Shasta.

**LOWER SPRINGS.**—Cor. Shasta Courier, June 22: There is some report of White, of the White Oak mine, having sold out for a good price. Since the reduction works has been conducted by Mr. Conant and others, capitalists have been up this way, and will in a short time interest themselves in the actual merit of our mines. Two-thirds of the mines that are lying idle would pay a dividend if proper management was conducted upon them. The Kit Carson and Mountain mines are looking as well as usual. Kit Carson has an excellent shaft down upon the ledge a depth of 30 feet, with a big ledge at the bottom of the shaft.

## Sierra.

**GOLD BLUFF.**—Mt. Messenger, June 23: The large ledge that was so rich in the upper levels of the Gold Bluff quartz mine, at this place, has been reached in the lower tunnel. The workmen also tapped the upper workings, a few days ago, with the upraise, at a height of about 350 feet.

## Siskiyou.

**THE STEAMBOAT MINE.**—Yreka Union, June 20: The new pumping machinery at the Steamboat mine, McAdams creek, keeps the mine dry and in a short time gold-laden gravel will be running through the flumes. A new shaft is being sunk, and on Sunday had reached a depth of 86 feet. The mine felt into good hands when Mr. F. D. Frazier assumed charge. He has practically demonstrated that deep mines can be successfully worked, and other mines of this character will probably be opened soon.

**WATER.**—Yreka Journal, June 20: The recent rains have been beneficial to the miners in several localities, by furnishing sufficient water for ground sluicing and hydraulics, but the supply stops soon after each shower, as there is but little snow on the mountains to help out, as during the early spring months. The storm at Salmon river caused a sudden and heavy freshet in that stream, washing out Bigelow's flumes above and below Sawyer's Bar, and requiring the head-dam to be blown out. Some days since, at first commencement of the late storms, the head-dam was also blown out, and rebuilt, not expecting another heavy storm at this season. Several others carrying on operations in the river, also sustained more or less damage from the freshet. The Hamilton boys struck a rich ledge of quartz on the head of Humbug last week, below the old Eliza mine, which prospects about \$500 to the ton. There is plenty of rich quartz in the vicinity of the Eliza mine, as was proven when the Eliza mine was first opened,

but hard work and capital is needed to develop that rich quartz-mining district. Geo. Sinimons, an experienced miner from Arizona, is now following some stringers in efforts to strike the rich Cornish ledge, which pinched out some years ago. The widening of the seam and dripping of considerable water from same, are good indications of being near a vein of quartz. Other miners from Arizona are also prospecting in same vicinity, and consider Siskiyou one of the richest of virgin gold mining fields on the coast. Messrs. Bruce Aldrich and George Allen have also found a rich ledge on the North Fork of Humbug creek, which prospects very rich.

**ETNA NOTES.**—Cor. Yreka Journal, June 20: The Koon Nothing creek quartz mines in South Fork of Salmon district, continue to show great improvement, with new finds constantly reported. The Radefinger & Hansen ledge increases in size as the work progresses, and is now three feet wide, the quartz paying \$30 to the ton. The Loftus, Morris & Hansen Co. have purchased the arastra of Mr. Clark, and will start up crushing in a few days. It is rumored here that the Koon Nothing Co. have purchased the Cash mill, and are making arrangements to transport it to their mine. At Black Bear the elevated railway is completed, and in a few days more the incline will also be finished, which will prove a great saving in expenses, as the company will not require so much hay and grain to feed animals as at present. The Gold Ball Mining Co., or Mountain Laurel ledge, looks fine, at least so reported by the superintendent, Mr. Ball. The ledge is six feet wide, and keeps the eight-stamp mill running day and night, with the expectation that the quartz will pay \$30 a ton.

## Trinity.

**THE "HARDSCRABLE."**—Journal, June 23: Gruss, who has contracted to run a tunnel in on the Hardscrable mine, East Fork district, has progressed about 35 feet, after running 25 feet he came across hard rock, which makes progress slow. There remains about 120 feet more to be run to tap the vein. A 65-foot incline has been sunk in the ledge but work had to be stopped on account of water coming in. As soon as the tunnel is completed, the drainage facilities afforded by it will enable work to be pushed on the ledge. The quartz at the bottom of the incline is very rich, both in free gold and sulphurets. Assays of the sulphurets run from \$800 to \$1400 to the ton.

**MILL.**—Capt. Weaver of East Fork was in town to-day, and tells us that all the machinery for the mill on the Golden Chest, that has arrived, has been packed up to the Backbone, and will be taken to the mill site as soon as the trail now being built is finished. He expects the mill to be in working order by the middle of September.

## Tuolumne.

**POCKET MINE.**—Union Democrat, June 23: The pocket mine of Wm. Lewis on Bald Mountain continues to yield handsomely. A considerable amount of gold has been taken out reaching well up in the thousands, but the exact amount is not known. From Mr. Scott, whom we saw the early part of the week, we learn that a new and splendid chute of ore has been struck in the north drift of the Back Oak mine. It is fully equal to any development heretofore.

## NEVADA.

## Washoe District.

**LADY WASHINGTON.**—Virginia Enterprise, June 23: The crosscuts at points 110 and 210 feet above the 725 level are in a promising formation of quartz, clay and porphyry. Work on the Keystone shaft has been discontinued.

**KEYES.**—The usual prospecting work is in progress.

**BULLION.**—Drifting south from winze bottom on 640 level.

**IOWA.**—The south drift from the east drift is in hard vein porphyry.

**OVERMAN.**—The shipments of ore amount to about 300 tons a week.

**ALPHA.**—The work of sinking the shaft to the 500 level is progressing finely.

**SEG. BELCHER.**—The east drift on the 1300 level shows no change of formation.

**CON. IMPERIAL.**—The work of retimbering the main north lateral drift is still continued.

**ANDES.**—Sinking a winze below the 240 level north drift, and drifting south on the 350 level.

**OPHIR.**—Ore of milling value is being extracted from the raise that is being made about the 1465 level.

**MEXICAN.**—East crosscut No. 1 from the main north drift on the 1300 level continues in vein porphyry.

**ALTA.**—Ore is being extracted from the usual points and the mill and concentrators are kept steadily running.

**BENTON.**—This mine is being prospected through the Alta shaft. The work is confined to explorations on the 725 level.

**UTAH.**—372 level: Opposite the south drift the north drift has been extended 40 feet; total, 78 feet. The formation is vein porphyry.

**BALTIMORE.**—Good progress is making in the work of cleaning out the west drifts on the 300 level. It is expected that ore will be reached in a few days.

**CROWN POINT.**—On the 600 level the raise still continues in ore of fair grade. The southeast drift on the 700 level cut several promising seams of ore.

**SIERRA NEVADA.**—The face of the south drift on the 500 level continues in vein material composed of quartz, clay and porphyry. Some water is still coming in at the face of the drift.

**WEST YELLOW JACKET.**—Streaks of ore are coming in at the bottom of the drift. It is expected that the whole face of the drift will shortly be in ore. The formation is becoming softer.

**BELCHER.**—Good headway is making in the east crosscut on the 500 level. The east drift on the 1300 level still continues in quartz. The new hoisting works at the shaft are going up rapidly.

**OCCIDENTAL.**—In the winze leading to the lower levels, 50 feet below the lower tunnel, are cutting out a station. Have extracted 62 tons of ore. Shipped to the Atlanta mill 142 tons of ore. Average assay

of wagon sample, \$23. Shipped to Excelsior mill 177 tons of ore. Average assay of wagon sample, \$22.

**BEST AND BELCHER.**—El Dorado level: The northwest drift from the main west drift has been extended 40 feet; total, 290 feet. The formation is clay and quartz, showing some value by assay.

**GOULD AND CURRY.**—During the week there has been extracted from the 250 and 300 levels and shipped to the Douglass mill 228 tons and 1000 pounds of ore. Average battery assays, \$24.03.

**UNION CONSOLIDATED.**—Crosscut No. 1 from the main north east drift on the 1300 level is still in porphyry. The north drift from west crosscut No. 2 is being advanced into quartz that is beginning to show metal.

**CHALLENGE.**—The joint Yellow Jacket south drift on the 1000 level has connected with the north drift on the same level. The raise jointly with the Confidence is making the usual progress, as also is the north drift on the 1000 level.

**DEXTER.**—This mine is located west of the Iowa and north of the old Virginia sidonia. It contains 1200 feet and runs north to and across Cedar ravine. It is being reopened through a tunnel and shows ore assaying \$30 a ton in silver and gold, silver predominating.

**CONFIDENCE.**—Are shipping to the Brunswick mill for reduction 185 tons of ore daily, the average battery sample of which shows a value of \$26.30 per ton. The mine shipped 6 bars of bullion, valued at \$18,094.48 on June 19th, making a total for the month to that date of \$68,701.28.

**HALE AND NORCROSS.**—Are extracting about 1500 tons of ore from the 600 and 700 levels, which is being shipped to the Mexican and Nevada mills. The average assay is \$33.50. All the stopes are looking and yielding well. Work has been resumed on the 400 level. They have bullion on hand and previously shipped on June account to the value of \$96,000.

**CON. CAL. & VIRGINIA.**—Good milling ore continues to be extracted from the stopes below the 1435 level. The 1500 level upraise is in fine ore and the west crosscut on the same level is in quartz which is beginning to show a considerable amount of metal. On the 1600 level ore of good grade is being extracted from the stopes around upraises Nos. 1 and 2. The south-west drift on the 1650 level is still in a mixture of porphyry and quartz. The usual quantity of ore has been shipped to the river mills and the average assays will be about the same as last week. A bullion shipment of 16 bars, valued at \$65,000, was made to San Francisco from the Con. Cal. Virginia office last Thursday evening.

**SAVAGE.**—On the 500 level the main west drift from the shaft passed through a body of ore 45 feet in width. In the center of this drift was started south, which is now out 50 feet, all the way in good milling ore. The ore is found to increase in richness as the deposit is followed southward. The car samples average \$35 a ton, but much richer ore is found in places in the main mass. On the 400 level the stopes on the north and south drifts continue to look and yield well. The car samples of this section average from \$33 to \$35 a ton. About 80 tons of ore a day are sent to the Rock Point mill below Dayton, on the Carson river. Thus far they have taken out about \$16,000 this month.

## Tuscarora District.

**DEL MONTE.**—Times-Review, June 22: Crosscut north from the tunnel has been extended 35 feet, passing through some vein matter.

**BELLE ISLE.**—The grade of ore from the old stope shows some improvement.

**GRAND PRIZE.**—The face of the east drift 200-foot level, has been advanced 14 feet, and showing good ore in the face.

**NORTH COMMONWEALTH.**—West crosscut from the first level, in prospect shaft, has been extended 35 feet, cutting seams of good ore.

**NAVAJO QUEEN.**—Northeast drift, 200-foot level, advanced 10 feet. Rock much harder. Face in ledge matter and seams of ore and spar.

**NAVAJO.**—South drift from No. 1 winze, east vein, 250-foot level, has been extended 25 feet. The vein is showing some good ore at this point.

**FOUND TREASURE.**—Crosscut No. 2 has been stopped to permit the water, which is now decreasing, to drain off. Upraise just southeast of the shaft on northwest vein has been carried up 20 feet. The ore seam is from 18 to 36 inches in thickness, but the ore is too low-grade to pay to ship, so it is being saved to concentrate.

**NORTH BELLE ISLE.**—Four hundred-foot level north has been extended 13 feet. The whole face of the drift is in ore of a medium grade. No. 1 winze from the 300-foot level has been sunk 11 feet the past week, and is looking more favorable. On the upper levels some high-grade ore is being extracted, and considerable retimbering is being done to protect the openings.

**NEVADA QUEEN.**—The work of putting the mine in shape to extract ore for the mill is progressing very favorably, as in extending the stopes on the 350-foot level, the ore continues much further than was indicated when the level was run; the ore is not so wide going north, but is very high-grade; south of crosscut it is 5 feet thick. One hundred tons of ore hoisted during the week from the various workings average assay \$220 per ton.

**COMMONWEALTH.**—The No. 1 east crosscut from No. 1 south drift has been extended 13 feet, and is cutting the same character of ore as in the 150-foot level south; assay yesterday, \$205 per ton. On the 150-foot level east crosscut from north drift has been extended 17 feet, and is encountering more water in the face. North intermediate is still showing good ore in the face. The 150-foot south drift has reached the Queen line and is still showing well. Four tons were taken from the face, about 5 feet wide, just as broken out, and sent to the mill; pulp assay from the battery, \$206.75 per ton, and worked to 93 per cent. Parties are preparing plans and specifications for the construction of the 20-stamp mill in the interest of the Queen and Commonwealth Co's.

## Tybo District.

**RUNNING STEADILY.**—Belmont Courier, June 16: Judge George Turin writes us that the Nye company's mill is running steadily, and bullion is being shipped regularly. Dimick shipped 22 tons of lead ore to Eureka on the 4th of June, and he delivered



the week previous 50 tons of second-class ore to the Tybo mill. The Ma Alta mine improves as depth is gained. A vein of fine ore has just been uncovered in the deepest workings of the mine. The outlook of Tybo is bright.

#### Jefferson District.

**OUTLOOK BRIGHT.**—Belmont *Courier*, June 16: We learn from James Bryson that the outlook at Jefferson is bright. Kanrohat's mill is running on ore from the Union and other mines, and the new roaster is in full operation. The Nelson brothers have struck some good ore, which is being reduced in the Kanrohat mill. The Harrison brothers have started up their mill on ore from their mine, and have made a hullion shipment. Messrs. Hancock, Cubbins and Bryson are working in the Jefferson mine and taking out some very rich ore. E. Frank Corille is extracting good ore from his mine; his second-class is reduced in the Kanrohat mill. The water supply is plentiful.

#### Eureka District.

**ORE SHIPMENTS.**—*Sentinel*, June 23: The following number of tons of ore were shipped from the mines of the district to the furnaces during the week: Featherstone, 3½ tons; White Pine, 18½ tons; Charlotte, 8½ tons; Williamsburg, 6½ tons; Dunderburg, 82 tons; Revelle, 5 tons; Morey, 9 tons; Little Risk, 8½ tons and Bulwhacker, 4½ tons. From the Leone, 10 tons, and Woodchopper, 22 tons.

#### Aurora District.

**REDUCTION WORKS AND ORE.**—*Esmeralda News*, June 23: During the last week a syndicate of English moneyed men, largely interested in this once prosperous camp, have purchased more mines and intend working them for all that is in them. They have purchased from L. Ravenelle, on the Walker river near the mouth of Rough creek, a tract of land for the purpose of erecting thereon large reduction works, suitable to work the immense quantity of ore around Aurora. In a short time the work of constructing the mill will be commenced and prosecuted with vigor, and when completed will be one of the largest and best equipped works of the kind on the Pacific Coast. It will be of the most modern improvement, with a view of economically handling large quantities of low grade ore. This mill will be within 16 miles of Aurora, and will be propelled by water-power. There is at present a good wagon road from the principal mines. The future of Aurora is now assured: Owing to matters incident to a prosperous mining camp, Aurora for many years has had a set back. At the present writing, the old camp is far from being dead, for there are from 50 to 60 men employed in and about the mines and mills and there is not an idle man to be seen on the street. As soon as the ledge is tapped in the Antelope, which is expected at any moment and may have been accomplished ere this, the Silver Hill mill will be put in operation, when a much larger force of men will necessarily be needed. The hoisting works on the Durand, one of the principal mines, has been completed and everything in and about the mine is working smoothly, and large quantities of ore are being extracted. The rich body of ore uncovered some time ago continues to hold out, and the more work that is done on the ledge the richer it gets. H. G. Blasdel and a number of other mine owners in the district are having surveys made preparatory to making applications for patents. Messrs. Colcord and Ann, while at San Francisco last month, purchased the machinery and other articles necessary for the erection of the reduction works on Walker river, and the same, it is said, is now on the road to the proposed mill site. It is certain that there will be no delay in the building of this new mill. The Antelope, though working under adverse circumstances, produced \$2,145.81 during the year 1887. Now, that it has been consolidated with the Silver Hill and everything is in the best of working shape, it is safe to predict that its bullion production for this year will almost double that of last year's record. By men well informed, it is estimated that 250 men will be laboring in the Aurora mines and mills within the next two months.

#### Grantville District.

**HOPEFUL.**—Belmont *Courier*, June 23: It is said that Grantville will soon see a mining boom. If the Horn Silver people sink a big shaft in the Alexander, they will open a mine that will make a big stir in Eastern mining circles. The bottom of the incline in this mine was in ore when orders came to shut down, and the ore stops were all looking well and producing sufficient good ore to keep the fine 40-stamp mill running steadily. The Horn Silver Company has a fine property in the Alexander, Brooklyn, Lloyd, Alameda, Cooper and adjacent mines.

#### San Antonio District.

**LEACHING.**—Belmont *Courier*, June 23: A. B. Eastwood is running his leaching works on chloride ore from the New Year mine. He is shipping the sulphides to San Francisco for treatment.

#### Ophir Canyon District.

**CHICAGO COMPANY.**—Belmont *Courier*, June 23: Work is progressing steadily in the Chicago Mining and Reduction Co.'s mine, Ophir canyon. The number of men at present employed is not large, but it is being gradually increased as developments justify.

#### Spanish Belt District.

**PRODUCING.**—Belmont *Courier*, June 23: The Barcelona mine of Spanish Belt continues to look well and produce its usual quantity of good ore. The concentrators in the Monitor-Belmont mill are running steadily on the low-grade ores and doing very satisfactory work. When the Barcelona is properly opened by a straight shaft it will show immense bodies of fine ore below water. It gives every indication of being one of the most extensive mines ever worked on the coast, and money expended in erecting hoisting works to sink a large shaft for the proper working of the mine will be returned a thousandfold in handsome dividends to the stockholders. The Barcelona is no baby mine. All mining men of known experience pronounce it the equal of any mine ever discovered. Its high-grade ores are rich in gold, silver and the baser metals; streaks of cinnabar are frequent. There is only one other mine in the world whose ore carry gold, silver and quicksilver—the famous Potosi mine of South America which has been successfully worked for upward of 300 years and has produced upward of \$1,000,000,000 in the precious metals. The Barcelona will do the same in less time if it is properly opened and worked. The biggest ore

bodies in it are below the tunnel level. The concentrates and high-grade ores are shipped to Salt Lake for treatment.

#### ARIZONA.

**NOTES.**—Prescott *Courier*, June 20: Machinery will soon be moved out to Copper Bisn. Frank Kuhne's mine, near the Sterling, is yielding rich ore. He recently shipped about 10 tons. Harlan & Harrington are driving a crosscut toward the Howard mine. They think they are near the vein. Lawler & Riggs have just shipped 10 tons from the Hillside. Another new strike was made in Dan O'Boyle's Montgomery mine a few days ago. It is a vein of 15 inches thickness that assays from \$150 to \$200 a ton in gold. Dan and his miners are now admiring the rich stuff. It was found 125 feet below the surface. Jas Allen was at the Etta mill a couple of days ago. It was doing good work. Plates looked well. E. S. Junior brought in five specimens of silver ore for Mr. F. W. Blake's cabinet. They are from the Conger, Eclipse and other mines. Richer ore would be hard to find. Rowe Bros. from Haysampa district give encouraging news. Mr. Kerr's mill at Antelope, is crushing Grey Devil mine ore, and Jas. M. Vand-burg says the mine is yielding like its namesake. Mr. Kerr will enlarge the mill. Wagons, with ore from the Boggs, Amulet, Conger, Hillside and other mines arrived yesterday at the sampling works.

**RICH MINES.**—Florence *Enterprise*, June 23: The Southern Pacific and Atlantic silver mines, adjoining each other in the Casa Grande district, 20 miles south of the railroad, are now proving themselves the richest properties of the district. The most thorough expert has examined these properties and the shipping record shows what the mines are capable of doing. From what can be learned it appears that large capital will test these estimable properties and from what the *Enterprise* has seen and knows of this A. No. 1 property, it would not be prophesying much from the mark when it is asserted that it will command a very large sum in any market, as 10,000 tons are represented to be showing up and it is an ore that runs very high.

#### COLORADO.

**SMELTER.**—Elk Mt. *Pilot*, June 22: We shall always believe that Crested Butte would be an excellent place for a smelter, simplifying works or some kind of an ore market. There are many locations here that would ship a little ore just for a starter in order to see how it would run if there was some place here to sell the ore and have it tested. Crested Butte is favored with many advantages over any other point. It is the shipping point for a vast section of country embracing a semi circle extending for over 20 miles and in this territory will be when it gets opened up one of the richest ore producing sections in the State. Other advantages are that we have coal, coke, timber and water as well as a great variety of ores to draw upon. The very best flinging ores are found here in sufficient quantity to run a smelter.

**NON-RESIDENT OWNERS.**—We regret to see so little mining done at this season of the year. What is the matter? We know that the mines are here and it is simply for the want of a disposition on the part of the mine owners. The most of our best mines are owned by non-residents, who have made some foolish blunder at some time or other, and simply quit in disgust. They will not work these properties themselves nor allow others to do so. There are a number of properties that would be worked under a lease if the owners would only permit. We can name over a dozen claims in the Irwin district alone that have produced good ore at some time and still have ore in sight that miners would be only too glad to leave on terms at least insuring the pay of wages if the owners would only lease them.

**YIELD OF GOLD.**—Denver *Republican*, June 20: Gold-lode and placer-mining in Colorado is greatly on the increase, and the mines of this State through their natural production promise to contribute much toward the existing inequality between silver and gold. Everywhere new gold mines are being opened, and reference need only be had to Government statistics to show that at the present rate of increase silver will soon command a premium. At Leadville the amount of gold contained in the ore produced is gaining annually, and there is now little ore taken out that does not contain some of the yellow metal. In addition to this, auriferous lodes have been opened in the great Carbonate camp, and 100 or more of stamps are pounding away on gold rock. Breckenridge and Gilpin are also improving in the production of gold. But the great gain this year promises to come from placer mines, which heretofore have been largely neglected, but which are again coming into popular favor. Not only will the reliable placers along the Blue river, the north fork of the Platt, Clear creek and the upper Arkansas produce more gold than usual this year, but the San Miguel river placers will come forward with very extensive yields. The great results which are expected from the San Miguel canyon promise to stimulate placer washing and resuscitate this almost obsolete branch of mining in Colorado. With its re-establishment many other valuable sections will be opened, notably the Hahn's Peak country, well known to old-time gulch miners as containing some of the largest and richest beds of auriferous gravel to be found anywhere in the world.

#### DAKOTA.

**FLOAT.**—Deadwood *Pioneer*, June 20: It is stated that negotiations are now pending which will lead to the starting up of the Garden City or Snyder stamp-mill, by Central City parties, within the next two months. Developments at mines in the neighborhood have been flattering, and enough ore is now in sight and available to keep the plant busy an indefinite length of time. Samuel Moll, lessee of the Hartsfeld smelter, expects to start the plant in about 30 days. The Bullion will furnish a quantity of ore, as will also the Merritt and Silver Queen.

#### IDAHO.

**EXCITEMENT.**—Silver City *Avalanche*, June 20: There is now quite an excitement over a lode recently discovered near the old Antoine lode at the head of Reynolds creek, to the left of the road com-

ing to Silver City. Mr. Rice, better known as the "Democrat," re-located the Antoine lode some time since, and from specimens of the ore exhibited to a man called "Tuscarora," the latter was induced to go to that neighborhood to prospect. It was but a short time until he found float, and then the lode, being near the Antoine, and carrying the same character of ore. Those who have seen the ore say that it is base, but rich. There is no doubt that this lode will prove valuable, as well as the old Antoine, which is thought to be the mother lode of that section. Supt. Howe of the Proustite Mining Co. reported the winze now being sunk on the Henrietta mine, Wagontown, down about 75 feet and in good ore. The Henrietta shaft will soon be 400 feet deep, the deepest in Wagontown, proving that the lodes in that place go down and grow larger, and retain their richness as depth is attained.

**THE NARROW GAUGES.**—Wood River *Times*, June 20: John A. Wilson, superintendent of the Narrow Gauge group of mines, who spent the past winter on his ranch, a few miles south of Hailey, has moved up to Deer creek, in order to resume operations in the Narrow Gauge mines and concentrating works. He thinks that the ore already extracted will keep the concentrating works running most of the season; and he intends to put men to work in the mines in a few days.

**FOUR FEET.**—Wood River *Times*, June 20: News comes from Broadford to-day of a new strike which has just been made almost in the very grass-roots on the Relief mine, at that place. A few days ago men were set to work sinking a new shaft to connect with the old workings and secure a main working opening. After attaining a depth of 16 feet they blasted into a body of high-grade steel-gray galena, which at noon to-day showed a width of four feet. As this strike was quite unexpected, it is hailed as an evidence of the correctness of the theory entertained by all miners, to wit: That this region has not even been as much as surface-scratched.

**ORO FINO.**—*Idaho Avalanche*, June 23: Mr. Leech, the superintendent of the Oro Fino, has had the mine pumped out and is now preparing for vigorous work on this great property. The machinery has all been put in thorough repair; several hundred feet of T rail track has been delivered on the ground; contracts made for a year's supply of wood and timbers, and a large amount of lumber ordered for other improvements. Mr. Leech expects to begin in a few days sinking the main shaft 100 feet deeper, and will, at the same time, drive the third level south to tap the big chute of ore which yielded the former owner, from the upper levels, a fortune two years ago. It is also proposed to begin mining the \$30 ore, left in former workings, because under the old regime \$30 ore did not pay for milling. Much of this will be added to the 2000 or 3000 tons of similar ore now on the dump. Arrangements have been made with one of the mills in town, by which experimental machinery will soon be put in to test the economical working of the ores.

#### MONTANA.

**THE HELENA SMELTER.**—Mining *Review*, June 20: As announced last week in the *Review*, three days in advance of the city dailies, Helena's great smelter will be built on the east side of the city, about five miles distant, and a little more than a mile south of the mouth of McClellan gulch. The smelter company have at the point selected a tract of land embracing about 1000 acres. The building of the Helena smelter means the reduction of ores at a cost not exceeding \$11 per ton—and perhaps somewhat lower. This of itself will be a long step in advance. It is but a few years since \$20 and \$25 per ton was considered a very low figure. It also means the development of hundreds of mines and the discovery of hundreds of others.

**ORO FINO DISTRICT.**—*New Northwest*, June 23: The news from the mines in Oro Fino district this week shows that work is going on steadily and with satisfactory results on the Lion, Champion and Franklin properties. Last week the Champion shaft had reached a depth of about 100 feet, and some good stringers of ore have shown up. At a meeting of the trustees it was decided to let a contract for the next hundred feet, and the same was taken by McBride & Co. at \$30 per foot. The contractors put in a Knowles pump, the old one not handling the water satisfactorily, and work is now going on in the shaft. The Franklin Co. has made good progress on the Jumbo, and ore has already been struck in the tunnel. Their prospects are very encouraging. On the Mountain Lion a contract has been let to Griffith Jones for the next 50 feet, at \$9 per foot, the company furnishing the timbers. There is now over 800 feet of tunneling, crosscuts, upraise and stopes on the property, and the condition Wednesday was regarded by Manager McMaster more favorable than at any preceding time. The tunnel is now in the neighborhood of 200 feet vertical depth and approaching closely where the solid ore body is expected on that level, having cut through the apex of several good ore shoots in its shallower workings. There is now 30 inches of high-grade ore in the face of the tunnel in a solid body, and seven feet altogether of good-looking ore. None has yet been assayed. The 50 feet contracted for is expected to carry the head under the heavy ore shoot that crops on the surface.

#### NEW MEXICO.

**WATER SCARCE.**—Silver City *Enterprise*, June 22: The hanging up of the stamps of the Deep Down mill at Pinos Altos, which was found necessary owing to the scarcity of water, seems to have caused considerable uneasiness with St. Louis stockholders. From the best and most reliable information which the *Enterprise* has been able to obtain, the mine is undoubtedly in better shape than ever before. The Wagner lead especially, is making a splendid showing, and with a little more development this lead alone will be able to supply the mill with ore. The Deep Down vein has been continuous from the surface to the present depth of the working shaft, and also to the face of the drifts which have been run each way on the lead. There is no occasion for uneasiness. It is unfortunate indeed, that a scarcity of water should occur just as the mill was being started, but it is much better to suffer a delay from that source than to be short of ore. The scarcity of water will be only for a few weeks, during the dry spell, after which everything will move along as was originally anticipated. In the mean time the mine

is being developed, and will be in a good shape by the time the mill is ready to run. The mine has lost nothing by the temporary shut down of the mill. Quite a ripple of excitement was created in this city during the early days of this week by the arrival in town of Pat Murthy, a prospector, with several ounces of coarse gold which he claimed to have washed out of a gulch on the head of Cherry creek, in the Pinos Altos range. Pat bought a large bill of grub, steel, etc., picked it out on burros, and during the night quietly stole away. Before going he stated that he had discovered the richest placers on the continent, having washed out two ounces of good gold in three hours.

**KINGSTON NOTES.**—*Shift*, June 20: The Iconoclast is sinking and developing with the new hoister. The Ingersoll is again at work with a force of men, and sinking. About 25 men are at work on the Lower North Percha. The Hiatt is closed down, preparing to form a new company. Tierra Blanco is quite a camp. Over 60 men are at work out there. Jno. S. McDonald is superintending a force of men on Tierra Blanco. Richer ore than ever has been struck on the Long Cabin at Tierra Blanco. The Lady Franklin is again sinking after a week spent in adjusting machinery. The Superior awaits the results of the Lady Franklin deep down workings. The deep down shaft of the Lady Franklin has passed the 400 foot level. Down they go with ore in sight all the way. The Butte boys still hold the fort. They have a shaft 85 feet in porphyry, 25 feet from the Black Colt line, and are preparing to put on a steam hoister to take out the water, and ore, when struck, which is dipping toward them from the Black Colt and Lady Franklin.

#### OREGON.

**KEYSTONE.**—Bedrock *Democrat*, June 18: Richard Hill, foreman of the Keystone mine, near Prairie City, Grant county, owned by Watson, Failing & Ladd, of Portland, is on a business trip to the city. He informs the reporter that work in the mine is progressing finely in the hands of a large force of miners. The mill is running night and day and the ore is giving good results. Other properties in the vicinity are developing in splendid shape, and the camp bids fair to become a very prominent mining center.

**THE NORTH POLE MINE.**—Mr. John Williams, superintendent of the North Pole mine on Cracker creek, is in the city for the purpose of meeting the recent buyers of the mine. Mr. Williams left a force of miners busily engaged making developments on the North Pole, and will be able to show its owners one of the best prospects on the coast on their arrival in what is now admitted to be one of the greatest mineral countries in the world.

**ANOTHER RICH STRIKE.**—News of another rich strike comes from the Henry Cable mine at Cracker creek, which is bonded to Eastern parties for the sum of \$80,000. Henry Cable has been diligently at work developing the property, and the other day opened out a vein of ore that is so rich that he will sack nearly a carload for shipment to Salt Lake for reduction. It will yield him over \$500 to the ton.

#### UTAH.

**REVIEW.**—Salt Lake *Tribune*, June 23: The week has been a dull one; the illegal importations of Mexican ores is having a deadening effect upon the mining industries of this Territory. There is no profit in the ordinary run of lead and silver ores; worse yet, ores that have heretofore sold well and have been considered first-class, afford so little margin to the owners as to be startling. The situation is serious, and unless relief comes the lead product is bound to be seriously diminished, and with it the product of silver. The receipts in this city for the week ending June 20th, inclusive, were \$71,976.19 in bullion and \$40,794.28 in ore, a total of \$112,770.47. For the week previous they were \$116,030.53, of which \$79,365.83 was bullion and \$36,664.70 was ore. The Ontario output for week was \$71,575.45 from ore sales and of bullion 20,138.26 fine ounces, an approximate total of \$31,713.71. The Daly product for the week was of ore \$7688.92; of bullion, 11,556.78 fine ounces; a total, approximately, of \$13,345.70. The Horn Silver makes no local showing for the week; it probably sold no ore, and raised but little. Fine bar receipts in this city for the week were to the value of \$33,837; base bullion, \$16,366.22. The Hanauer smelter produced during the week bullion valued at \$14,400; the Germania, \$7312.97. Ore receipts in this city were to the value of \$19,263.92 by Wells, Fargo & Co.; \$16,900 by McCormick & Co.; and \$4630.36 by T. R. Jones & Co.

**PARK NOTES.**—*Record*, June 23: The Massachusetts hoisting works were closed down Wednesday for a few days. Superintendent Curtis went down to Salt Lake for an air compressor, and soon it will be put in place, followed by Burleigh drills. The shaft is down to the 600-foot level and a fine station has been made there. A few feet of drifting has been done, but the developments will be made very rapidly when the new machinery gets into thorough working order. Last week he settled up with the Wilson Brothers who have been sinking a shaft by contract on the Dolberg group, between the Morgan and the Anchor. A second contract was let to the Wilsons to run a 200-foot tunnel on the opposite side of the gulch. The shaft is down about 60 feet and there is a fine seam of ore worth going down on. Owing to its proximity to the lake the water handicaps operations at present. Judge Smith feels confident that the Dolberg group will ultimately be a rich, productive property and he is to be congratulated on his prospects.

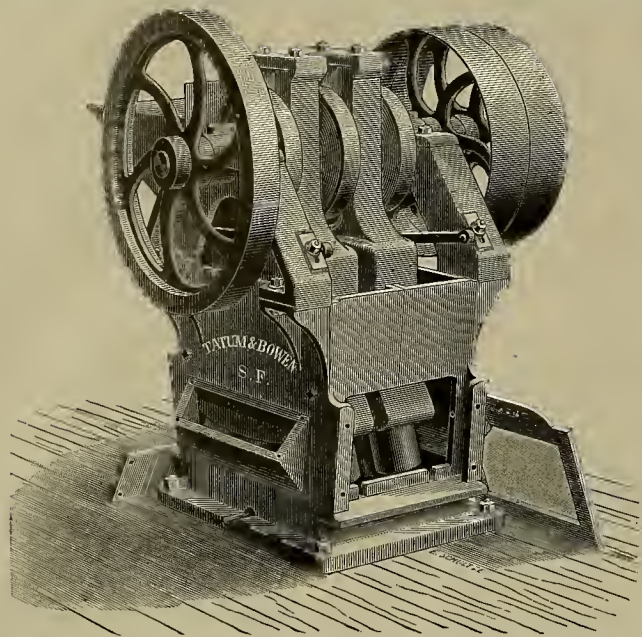
**A NEW STRIKE ON PIONEER RIDGE.**—Ore has been found in the old Pioneer patented ground, farther west than any point where it has been opened before. The ore goes over three hundred ounces to the ton in silver and 40 per cent lead.

#### WYOMING.

**COAL.**—Deadwood *Pioneer*, June 20: A good deal of talk has been recently heard regarding the Wyoming coal fields. Several local parties are interested in locations therein, and propose to push developments during the summer. It is claimed that the mineral is there in inexhaustible quantities and that it makes most excellent fuel, is free from sulphur and cokes well.



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In respect to capacity in speed of drilling, perhaps it is in order to say that in every authoritative contest for speed yet initiated, the Rand Drills have, without exception, been victorious. This fact, coupled with another important one, that the drills use much less air and cause less repairs, has won for them nearly all of the Eastern mining trade, which has kept their works always busy.

Since the reasons which formerly restrained them from the California market no longer exist, they are now in this field for the business.

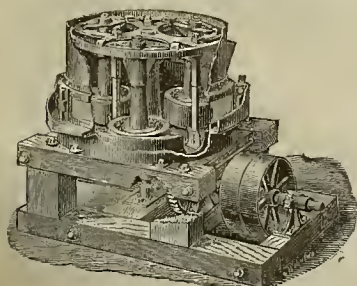
SPECIAL ATTENTION is called to the latest designed sectional Compressor just built for the Batopilas mine in Mexico, and to the Compound Engine Compressor now being built for the Anaconda mine in Montana.



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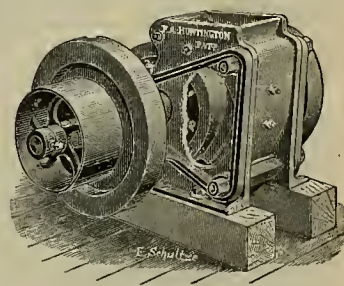


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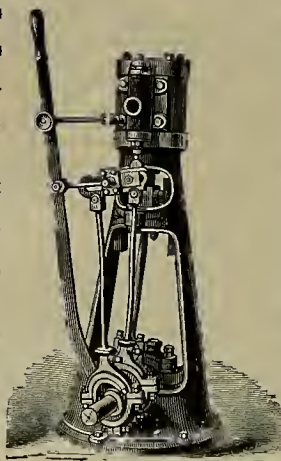
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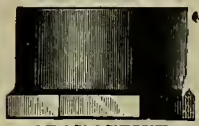
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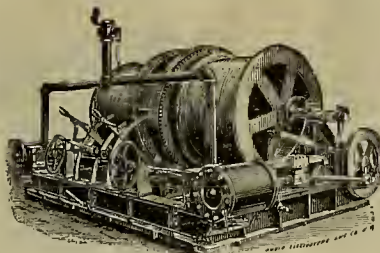
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Manufacture Three Kinds of Powder, which are acknowledged by all the Great Chemists of the World as

The Safest and Strongest High Explosives in the Market.

**GIANT POWDER or DYNAMITE,**

Of Different Strengths as Required.

NOBEL'S EXPLOSIVE GELATINE, which contains 94 per cent of Nitro-Glycerine, and GELATINE-DYNAMITE, Stronger than Dynamite and even Safer in Handling.

**JUDSON POWDER IMPROVED.**

FOR RAILROADS AND LAND CLEARING. Is from three to four times stronger than ordinary Blasting Powder, and is used by all the Railroads and Gravel Claims, as it breaks more ground, pulverizes better and saves time and money. It is as dry as the ordinary Blasting Powder and runs as freely.

**BANDMANN, NIELSEN & CO.,**

OAPS and FUSE for Sale

GENERAL AGENTS, SAN FRANCISCO CAL.

**THOMAS PRICE'S ASSAY OFFICE,**  
CHEMICAL LABORATORY,  
**BULLION ROOMS and ORE FLOORS,**

524 Sacramento Street, San Francisco, Cal.

COIN RETURNS ON ALL BULLION DEPOSITS IN 24 HOURS.

WORKING TESTS OF ORES BY ALL PROCESSES.

SPECIAL ATTENTION PAID TO CONCENTRATION OF ORES.

Ores Received on Consignment, Sampled, Assayed, and Disposed of in the Open Market to the Highest Bidder.



## List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey &amp; Co., Pioneer Patent Solicitors for Pacific States.

From the official report of U. S. Patents in Dewey &amp; Co.'s Patent Office Library, 270 Market St., S. F.

FOR WEEK ENDING JUNE 19, 1888.

- 384,682.—OBTAINING PRECIOUS METALS FROM SPEISS—L. W. Davis, Eureka, Nev.  
 384,748.—DISK CULTIVATOR AND SEEDER—B. C. Dorsey, Tulare, Cal.  
 384,755.—DANGER SIGNAL FOR BRIDGES—M. O. Godding, Monrovia, Cal.  
 384,631.—SHAWL STRAP AND FIRE ESCAPE—Lee & Aetion, Dal es, Ogn.  
 384,706.—PUMP—J. A. Murry, Tucson, A. T.  
 384,707.—GAME COUNTER—F. G. Nash, S. F.  
 384,937.—FEED WATER HEATER—David Stark, S. F.  
 384,940.—PHOTOGRAPHIC CAMERA—H. Swain, S. F.  
 384,941.—STEAM GENERATOR—E. H. Thompson, Newark, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co., in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect accuracy, at reasonable rates, and in the shortest possible time.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

GAME-COUNTER.—Frank G. Nash, S. F., No. 384,707. Dated June 19, 1888. This is a device for scoring games, especially cribbage. The invention consists in a plate having one or more longitudinal slots with short cross-slots opening out from each side thereof, and on double-headed pegs fitted and adapted to be moved on the slots. The object is to provide a cribbage-board with the pegs so arranged that they cannot be disconnected and so that all danger of misplacement or loss is avoided.

DISK CULTIVATOR AND SEEDER.—B. C. Dorsey, Tulare, assignor of one-half to Wm. L. Morrow, S. Luis Ohio. No. 384,748. Dated June 19, 1888. This invention relates to that class of disk cultivators and seeders represented by patent No. 344,950, issued to the same inventor July 6, 1886, and in which an implement is shown having peculiarly arranged and adjustable disk gangs carried by a wheeled frame. This disk cultivator and seeder consists of a frame made of longitudinal and transverse bars, carrying the wheels on each side and located at diagonally opposite corners, the oppositely inclined bars pivoted to the sides of the frame, the lever and connections for carrying and fixing the inclination of the bars, the shafts supported from standards carried by the inclined bars, and the disk gangs carried by the shafts, said gangs having smaller and less concave disks on each end, and the cleaning spikes projecting downwardly from the inclined bars and between the disks.

PUMPS.—John A. Murray, Tucson, A. T. No. 384,706. Dated June 19, 1888. In opening the valves in this pump, turn on their hinge-lines toward the center, so that in discharging they give room for the passage of the water. In the operation of the pump the lower piston or plunger takes the place, when acting as a double-acting pump, of the ordinary check-valve. The two plungers or pistons are auxiliary; but at the same time either one can be stopped or held stationary and not interfere with the working of the pump, except as to the quantity of work performed. In order to prevent the rods from becoming unscrewed and lost, when many lengths are used, as in deep wells, the rods of the lower piston have left-hand threads while those of the upper piston have right-hand threads. The lower piston is made flat where it passes through the upper piston-valve which prevents its turning and gives more room for water to pass. The arms or wrist-pins to which the crank-rods also connect, prevent the piston-rods from turning. The discharge takes place through a spout at the top of the pump cylinder, and is continuous while the pump is in motion. By having the crank-shaft journaled in the manner this is, and below the top of the cylinder, it leaves the upper end and discharge free and unimpeded, and it also enables the operator to work it conveniently either by hand or power as may be desired.

## Bullion Shipments.

We quote shipments since our last, and shall be pleased to receive further reports:  
 Mount Diablo, June 22, \$13,795; Con. California and Virginia, 22, \$73,791; Confidence, 22, \$18,094 (total for June account, \$68,701); Savage, 22, \$12,700; Standard Con., 22, \$7422; Eureka Co., 22, \$4007; Savage, 24, \$16,000; Hale and Norcross, 22, \$96,000; North Belle Isle, 26, \$41,430; Alce, 19, \$80,000; Blue Bird, 19, \$11,636; Silver Bow, 19, \$13,236; Lexington, 19, \$27,280; Germania, 19, \$3137; Hanauer, 19, \$3500; Germania, 26, \$1162; Hanauer, 20, \$1800; Germania, 20, \$1458; Hanauer, 21, \$2260; Queen of the Hills, 22, \$900; Germania, 22, \$1366; Crescent, 23, \$5150.

SOME miners are working what they think is a quicksilver mine, near Edwards' bridge, Nevada county.

## MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

## ASSESSMENTS.

COMPANY.	LOCATION.	NO. AMT. LEVIED.	DELINQ'T. SALE.	SECRETARY.	PLACE OF BUSINESS.	
Alta M Co.	Nevada.	37.	50.	May 12, June 18.	July 9. W. H. Watson.	362 Montgomery St.
Bulwer Con M Co.	California.	4.	20.	May 3, June 7.	July 9. L. Osborn.	399 Montgomery St.
East & Belcher M Co.	Nevada.	40.	25.	June 5, July 10.	July 31. L. Osborn.	399 Montgomery St.
Bodie Tunnel M Co.	California.	15.	25.	June 5, July 8.	July 31. C. G. Harvey.	303 California St.
Challenge Con M Co.	Nevada.	4.	50.	May 28, June 29.	July 18. C. L. McCoy.	329 Pine St.
Champion M Co.	California.	30.	10.	May 11, June 18.	July 10. T. W. 12 1.	329 Montgomery St.
California Slate Co.	California.	1.	10.	Apr 18, May 24.	June 25. O. Hanson.	10 California St.
Diana G & S M Co.	Nevada.	7.	10.	June 5, July 10.	July 31. J. W. Fox.	310 Pine St.
Eldred M Co.	California.	2.	01.	May 28, June 18.	July 30. N. A. Eldred.	15 3 California St.
Gould & Curry S M Co.	Nevada.	59.	50.	June 22, July 26.	Aug 16. A. K. Durbow.	303 Montgomery St.
Ju-tice M Co.	Nevada.	46.	25.	May 17, June 11.	July 2. R. E. Kelly.	419 California St.
Live Oak Drift G M Co.	California.	9.	15.	May 13, July 17.	Aug 6. J. Morley.	328 Montgomery St.
Nye M Co.	Nevada.	1.	15.	May 23, July 24.	W. J. Doran.	400 California St.
Occidental Con M Co.	Nevada.	2.	20.	May 29, July 2.	July 25. A. K. Durbow.	399 Montgomery St.
Russell Reduction & M Co.	California.	2.	10.	June 6, July 9.	July 31. M. Morio.	328 Montgomery St.
Silver King M Co.	Arizona.	1.	50.	June 22, July 30.	Aug 23. J. Nash.	328 Montgomery St.
Summit M Co.	California.	10.	25.	June 5, July 12.	July 31. G. W. Session.	399 Montgomery St.
Seg Belcher & Mides Con M Co.	Nevada.	21.	25.	June 5, July 8.	July 30. E. B. Holmes.	329 Montgomery St.
Scorpion M Co.	California.	25.	10.	May 15, June 22.	July 16. G. W. Spingau.	10 California St.
Western Mineral Co.	California.	2.	1,000.	May 21, July 30.	Aug 20. A. Chermant.	328 Montgomery St.

## MEETINGS TO BE HELD.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	MEETING DATE
Best & Belcher M Co.	Nevada.	L. Osborn.	309 Montgomery St.	Annual. July 6
Billion Beck & California M Co.	California.	A. Badlam.	322 Montgomery St.	Annual. July 13
Benton Con M Co.	California.	V. R. Allen.	390 Pine St.	Annual. July 27
North Belle Isle M Co.	Nevada.	J. W. Fox.	310 Pine St.	Annual. July 27
Ophir M Co.	Nevada.	G. D. Edwards.	414 California St.	Annual. July 12
Phil Sueden Con M Co.	Nevada.	J. F. Holling.	433 Kearny St.	Annual. June 30
Scott Bar M Co.	California.	W. Richardson.	309 Montgomery St.	Annual. July 2
Spring Valley G M Co.	California.	H. Pichor.	329 Sansome St.	Annual. July 2
Trojan M Co.	Nevada.	J. F. Holling.	533 Kearny St.	Annual. June 30
Union Con M Co.	Nevada.	J. M. Buffington.	303 California St.	Annual. July 16

## LATEST DIVIDENDS—WITHIN THREE MONTHS.

NAME OF COMPANY.	LOCATION.	SECRETARY.	OFFICE IN S. F.	AMOUNT.	PAYABLE
Con California & Va M Co.	Nevada.	A. W. Havens.	309 Montgomery St.	50.	June 11
Confidence S M Co.	Nevada.	A. S. Groth.	306 Pine St.	2.00.	June 12
Eureka Con M Co.	Nevada.	H. R. P. Hutton.	310 Pine St.	25.	July 9
North Belle Isle M Co.	Nevada.	J. W. Fox.	310 Pine St.	50.	May 7
Hale & Norcross S M Co.	Nevada.	J. F. Lightner.	303 Montgomery St.	1.50.	May 7
Oregon Coal & Navigation Co.	California.	R. W. Williams.	320 Sansome St.	1.50.	May 2
Piedmont & Salt Soda Co.	California.	A. H. Clough.	230 Montgomery St.	1.00.	June 11
Standard Con M Co.	California.	J. W. Fox.	310 Pine St.	65.	June 12

## New Incorporations.

The following companies have been incorporated, and papers filed in the office of the Superior Court, Department 10, San Francisco: WASHINGTON CEMENT GRAVEL M. Co., June 20. Location, the Daisy Cement Co.'s claim, Washington township, Nevada county, Cal. Capital stock, \$20,000. Directors, Robert T. Roberts, Hugh J. Owen, H. Jones, Matthew H. Nixon and John Morris.

JACOB STRAHLE SLATE CO., June 20. Object, to mine, deliver, bundle and deal in every kind and quality of slate, the product of California or Scotland or of any other State or country. Capital stock, \$300,000. Directors, Jacob Strahle, George Holloway, Harry Pauls, Frank D. Culver, Gustav Behrend, Joseph Kutner and William E. Shepman.

GLENDALE CANNING CO., June 20. Capital stock, \$100,000. Directors, E. Ransome, A. J. Gove, F. C. de Long, G. E. Chittenden and J. B. McKee.

GOLDEN GATE AUTOMATIC STREET AND STATION INDICATOR CO., June 26. Directors—John Kueffer, Emil Lommatzsch, Henry Freytag, Theodore Bacigalupi, Frank Van Denter, Henry G. Krasky and Josiah White.

ELECTRIC IMPROVEMENT CO., June 21. Capital stock, \$5,000,000. Directors—Frank Buttermoth, A. J. Bowie, Jr., Louis T. Haggin, Henry C. Drager, F. W. Sharon, W. H. Howard and J. B. Randol.

## Mining Share Market.

What fluctuations occur in the stock market in these days are very small indeed. More is bought now of a 25 per cent rise than used to be the case with a 25 cent one. The mines on the Comstock are producing ore and yielding hullion more than has been the case for years.

As regards the outlook on the lode, it has never been better. All the leading mines have large bodies of ore in sight and new developments are constantly being made. The Savage is now showing up a good body of ore 45 feet in width on the 500 level.

Good developments are being made in the north-end mines, and the milling situation is better than for some years past. There is no reason why a good trading market should not be seen as soon as brokers and dealers get their heads somewhat cleared of political cobwebs and their stomachs of the debris of the celebration of the National holiday.

## Our Agents.

OUR FRIENDS can do much in aid of our paper and the cause of practical knowledge and science, by assisting Agents in their labors of canvassing, by lending their influence and encouraging favors. We intend to send once but worthy men.  
 JOHN O. H. LAMPADES—Ventura Co.  
 G. W. INGALLS—Arizona Territory.  
 A. F. JEWETT—Tulare Co.  
 C. E. WILLIAMS—Yuba and Sutter Co.'s.  
 R. G. HUSTON—Montana Territory.  
 WM. WILKINSON—Butte and Tehama Co.'s.  
 W. W. THORALDS—Sonoma, Napa and Yolo Co.'s.  
 F. B. LOGAN—Placer Co. and Nevada State.  
 S. L. FLETCHER—Santa Barbara, Los Angeles and San Diego Co.'s.

## Complimentary Samples.

Persons receiving this paper marked are requested to examine its contents, term of subscription, and give it their own patronage, and as far as practicable, aid in circulating the journal, and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber, please show the paper to others.

J. A. JOHNSON, 307 Montgomery street (the Nevada Bank building) is the general agent of the Siles quartz machinery, and offers easy terms for introduction.

## DIVIDEND NOTICE.

SAN FRANCISCO SAVINGS UNION, 532 California St., cor. Webb.—For the half year ending with 30th June, 1888, a dividend has been declared at the rate of four and one-half (4½) per cent per annum on term deposits, and three and three-fourths (3¾) per cent per annum on ordinary deposits, free of taxes, payable on and after Monday, 2d July, 1888.

LOVELL WHITE, Cashier.

## DIVIDEND NOTICE.

THE GERMAN SAVINGS AND LOAN Society, 526 California St.—For the half year ending June 30, 1888, a dividend has been declared at the rate of four and one-half (4½) per cent per annum on term deposits, and three and three-quarters (3¾) per cent per annum on ordinary deposits. Payable on and after Monday, July 2, 1888.

WM. HERRMANN, Secretary.

## HEALD'S

## BUSINESS COLLEGE,

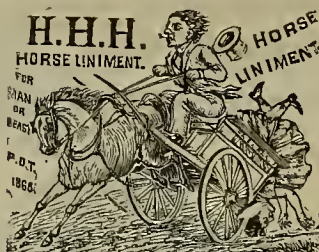
24 POST ST., S. F.

FOR SEVENTY-FIVE DOLLARS THIS College instructs in Shorthand, Type Writing, Book-keeping, Telegraphy, Penmanship, Drawing, all the English branches, and everything pertaining to business, for six full months. We have sixteen teachers, and give individual instruction to all our pupils. Our school has its graduates in every part of the State.

SEND FOR CIRCULAR.

E. P. HEALD, President.

C. S. HALEY, Secretary.



THE H. H. H. Horse Liniment puts new life into the Antiquated Horse! For the last 14 years the H. H. H. Horse Liniment has been the leading remedy among Farmers and Stockmen for the cure of Sprains, Bruises, Stiff Joints, Spavins, Windgalls, Sore Shoulders, etc., and for Family Use is without an equal for Rheumatism, Neuralgia, Aches, Pains, Bruises, Cuts and Sprains of all characters. The H. H. H. Liniment has many imitations, and we caution the Public to see that the Trade Mark "H. H. H." is on every Bottle before purchasing. For sale everywhere for 50 cents and \$1.00 per Bottle.

For Sale by all Druggists.

## WINCHESTER HOUSE,

44 Third Street, San Francisco, Cal.

This Fire-proof Brick Building is centrally located, in the healthiest part of the city, only a half block from the Grand and Palace Hotels, and close to all Steamboat and Railroad Offices.

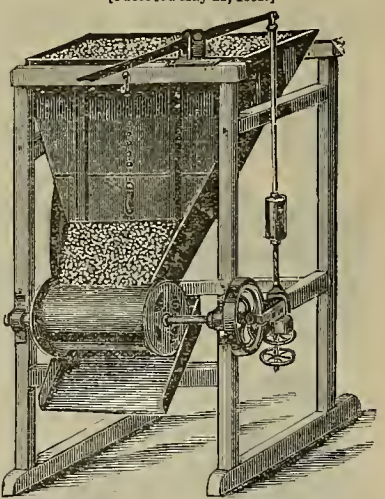
Laundry Free for the use of Families  
HOT AND COLD BATHS FREE.

Terms, Rooms and Room, \$1.00 per Day  
Add upward.

ROOMS WITH OR WITHOUT BOARD.  
FREE COACH TO THE HOUSE.  
J. POOLEY.

## THE ROLLER ORE FEEDER

(Patented May 28, 1882.)



This is the best and cheapest Ore Feeder now in use. It has fewer parts, requires less power, is simpler in adjustment than any other. Feeds coarse ore or soft clay alike uniformly, under one or all the stamps in a battery as required.

In the Buckner Hill Mill it has run continuously for two years, never having been out of order or costing a dollar for repairs.

Golden State and Miners' Iron Works,  
Sole Manufacturers,  
527 First Street, San Francisco, Cal.

## Table of Lowest and Highest Sales in S. F. Stock Exchange.

NAME OF COMPANY.	WEEK ENDING June 7.	WEEK ENDING June 14.	WEEK ENDING June 21.	WEEK ENDING June 28.
Alpha.	1.20	1.55	1.25	1.75
Alce.	1.00	.75	1.00	1.70
Andes.	1.00	1.10	.85	1.25
Argenta.	1.25	.45	3.15	4.40
Belcher.	3.25	.45	3.15	4.40
Bodie.	2.25	3.90	3.65	4.50
Bulwer.	1.00	1.20	.90	1.30
Baltimore.	.60	.80	.65	.85
Belle Isle.	.50	.50	.50	.55
Bodie Con.	2.05	2.30	2.05	2.25
Bodie Tunnel.	1.00	1.10	1.00	1.10
Bulwer.	.50	.75	.70	.85
Con. Va. & Cal.	.95	1.15	.85	1.10
Challenge.	3.10	4.05	3.05	4.75
Champion.	8.00	3.60	3.00	4.20
Chollar.	1.00	1.05	1.00	1.05
Confidence.	1.10	1.20	1.05	1.10
Con. Imperial.	.35	.45	.30	.45
Caledonia.	.30	.38	.30	.45
Con. Pacific.	1.10	1.25	1.05	1.10
Crown Point.	4.10	4.95	3.65	4.65
Crocker.	.85	1.05	.85	1.10
Central.	1.00	1.10	1.05	1.10
East B. & B.	.40	.45	.40	.45
Eureka Con.	8.00	6.00	6.00	6.00
Exchange.	.90	1.15	.80	1.20
Grand Prize.	2.10	2.20	1.85	2.05
Gould & Curry.	3.10	4.25	2.75	3.60
Hale & Norcross.	8.75	7.25	6.75	7.75
Holmes.	1.50	1.50	1.50	1.50
Independence.	.85	.85	.75	.85
Iowa.	.85	.85	.75	.85
Jalia.	.55	.65	.55	.65
Justice.	.55	.65	.55	.65
Keenack.	2.05	2.25	1.75	2.60
Lady Wash.	.30	.40	.25	.45
Martia White.	.30	.40	.25	.45
Mon.	1.25	1.15	1.20	1.45
Mexican.	3.00	3.75	2.90	4.15
Mt. Diablo.	3.75	3.75	3.75	3.75
Northern Belle.	1.50	1.50	1.50	1.50
Navajo.	1.50	1.50	1.50	1.50
North Belle Isle.	3.00	3.30	3.00	3.20
Niagara.	3.15	3.80	3.15	4.00
Nev. Queen.	3.15	3.80	3.15	4.00
North G. & C.	1.70	1.75	1.70	1.75
Occidental.	6.00	7.00	5.75	7.25
Ophir.	1.25	1.70	1.20	1.75
Overman.	2.00	3.25	2.50	3.40
Potosi.	1.95	2.25	1.95	2.35
Peerless.	.65	.80	.60	.80
Perr.	.65	.80	.60	.80
P. Sheridan.	3.20	3.90	3.00	4.85
Silver Star.	3.20	3.90	3.00	4.85
Savage.	2.10	2.25	2.00	2.35
S. B. M.	3.15	3.30	2.90	3.80
Sierra Nevada.	4.00	4.50	4.00	4.50
Silver Hill.	.40	.55	.45	.60
Silver King.	.50	.60	.40	.65
Scorpion.	.50	.60	.40	.65
Syndicate.	2.70	3.15	2.75	3.65
Union Con.	1.05	1.30	1.10	1.55
Utah.	3.90	5.00	3.60	4.60
Yellow Jacket.	3.90	5.00	3.60	4.60

## Sales at San Francisco Stock Exchange.

WEDNESDAY June 27.	100 Eureka Con.	.62
50 Andes.	250 Gould & Curry.	3.05
200 Alpha.	200 Grand Prize.	2.45
100 Baltimore.	120 Hale & Nor.	.71
22) Belcher.	100 Lady Wash.	.35c
195 B. & Belcher.	225 Mexican.	3.60
100 Bullion.	350 Mono.	4.45
50 Bodie.	50 N. Belle Isle.	.95
200 Bulwer.	200 Ophir.	.62
210 Challenge.	225 Overman.	1.75
350 Chollar.	350 Potosi.	3.90
200 Con Va & Cal.	200 Savage.	4.25
110 Crown Point.	500 Scorpion.	.65c
200 Con Imperial.	500 S. B. & M.	2.80
10 Confidence.	50 Sierra Nevada.	3.45
725 Central.	340 Union Con.	3.65
200 Crocker.	610 Utah.	4.45
200 Exchange.	115 300 Yellow Jacket.	4.70

## A. L. OTT,

Manufacturing Jeweler & Diamond Setter,  
No. 13 TRINITY STREET.

Above Montgomery, bet. Bush and Sutter, San Francisco.

Designs and Estimates furnished on application.

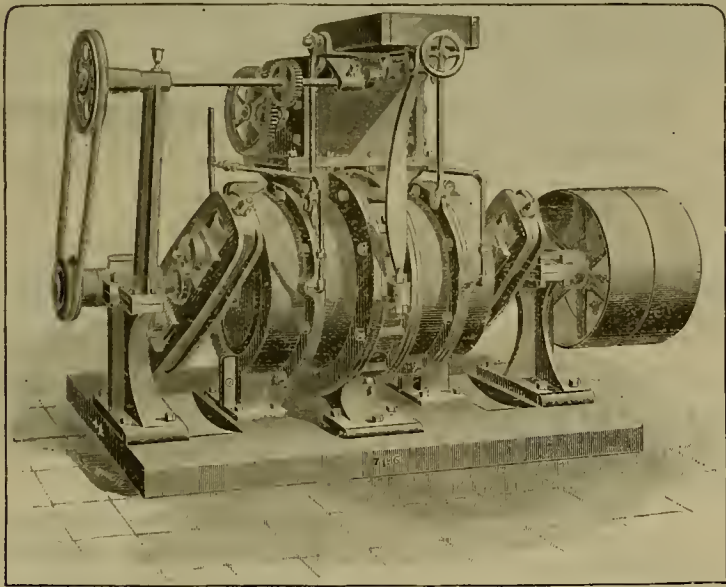
## California Inventors

AND FOREIGN PATENT SOLICITORS, for obtaining Patents and Caveats. Established in 1860. Their long experience as journalists and large practice as Patent attorneys enables them to offer Pacific Coast Inventors far better service than they can obtain elsewhere. Send for free circulars of information. Office of the MINING AND



# FRISBEE WET MILL.

This Mill, with a weight of less than 9000 pounds, has a capacity equal to 30 stamps, reducing two and a half to three tons per hour of hard quartz to 40 mesh.



IT HAS NO MORE WEARING PARTS THAN CORNISH ROLLS,

And renewals will not cost over one-half as much as for stamps. The attention of parties having Cement Gravel is called to this Mill, as it will run 100 tons per day to No. 8 mesh.

OUR DRY MILLS are the most economical ever built, and are extensively used with record of several years. No grinding in pans. Mill finishes to any fineness desired.

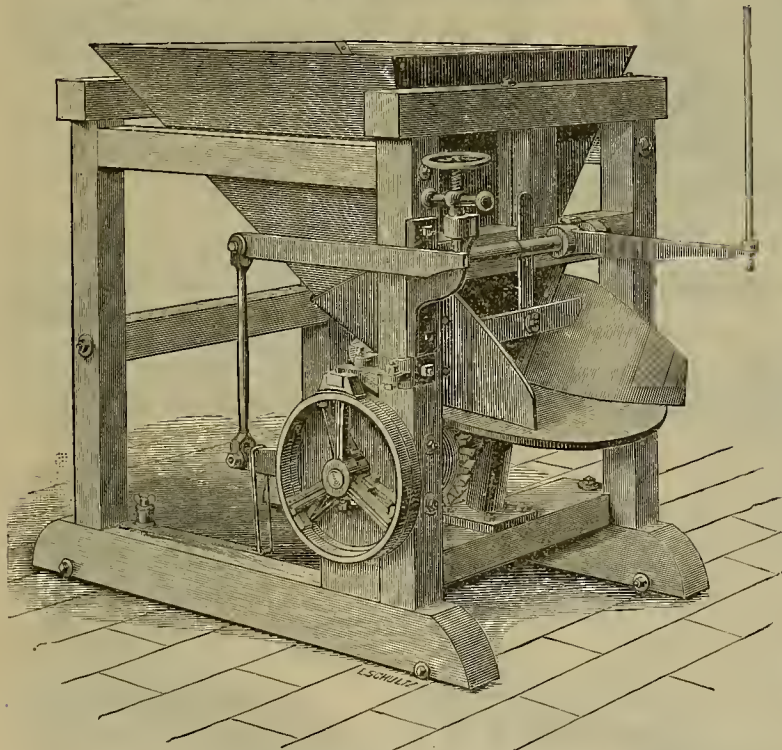
## FRISBEE-LUCOP MILL COMPANY,

GIDEON FRISBEE, Manager. - - - 461 Howard St., San Francisco

HOOKER & LAWRENCE, Gen'l Ag'ts. 145 Broadway, New York.

## JOSHUA HENDY MACHINE WORKS,

Nos. 39 to 51 FREMONT STREET, SAN FRANCISCO, CAL.



### "HENDY" IMPROVED "CHALLENGE" ORE FEEDER.

The best form of Feeder ever devised, and pronounced by reputable mining men to be far superior to any form of "Roller" Feeder manufactured. We refer to the following gentlemen who have furnished us with testimonial letters to the above effect, which can be seen at our office, viz.:

N. W. CROCKER, Supt. Bunker Hill Gold Mining Co., Amador City, Cal. | D. C. WICKHAM, Taylor Mine, Greenwood, Cal.  
W. G. ROBERTS, Greenwood, El Dorado Co., Cal. | J. R. TREGLOAN, Supt. South Spring Hill Gold Mining Co., Amador City, Cal.

WE ARE MANUFACTURERS OF THE

'CHALLENGE,' 'STANFORD,' 'TULLOCK,' & 'ROLLER' FEEDERS,

And will furnish descriptive Catalogues and quote prices upon application.



## ELECTRIC DEVELOPMENT COMPANY.

### Incandescent & Arc Electric Lights.

Electric Motors, Dynamos, Transformers, Elevators, Signals and all kinds of Electrical Systems for lighting and transmission of power, either direct or with storage Batteries.

For Mines, Hoisting Works, Mills, Reduction Works, Indoor and Outdoor Illumination of every kind. Gas, Oil and Candles superseded by the

### EDISON INCANDESCENT LIGHT,

The only complete and satisfactory incandescent system. Lights require no attention and are under complete control. Over 500,000 lights in use in the United States. SELF-REGULATING ARC LIGHTS turn night into day and afford a means of working the whole 24 hours; invaluable to contractors and others to whom time is an object. Estimates and designs on application.

Offices and Showrooms, 323 PINE ST., SAN FRANCISCO.

Portland, Or.

Sydney, N. S. W.

## PARKE & LACY,

21 and 23 Fremont Street,

SAN FRANCISCO, CAL.

—IMPORTERS AND MANUFACTURERS OF—

# MACHINERY

ENGINES,

ROCK

BOILERS,

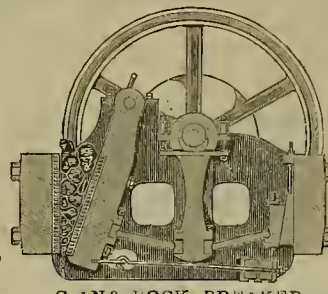
BREAKERS,

STEAM

PULVERIZERS,

PUMPS.

CONCENTRATORS.



Giant Rock Breaker.

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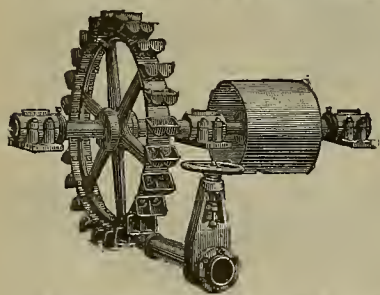
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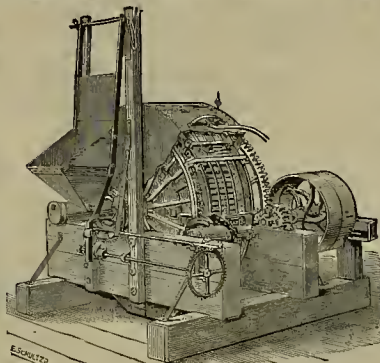
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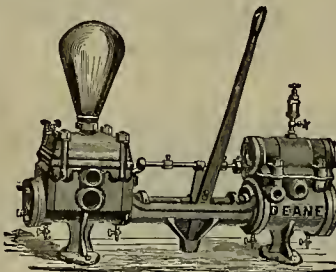
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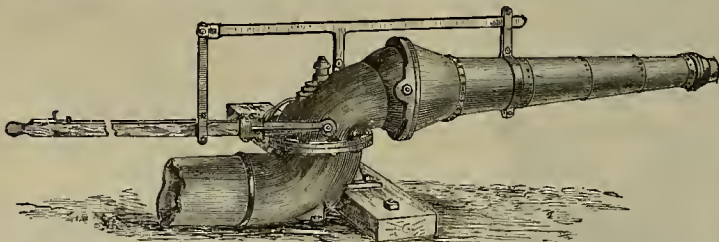
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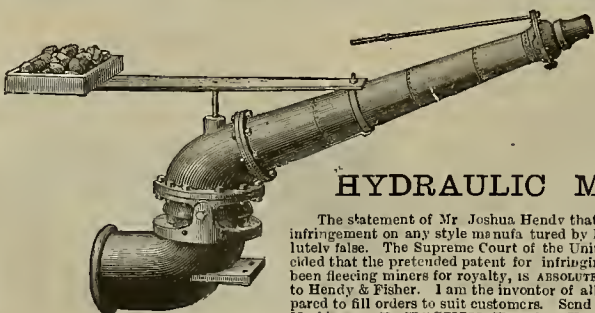
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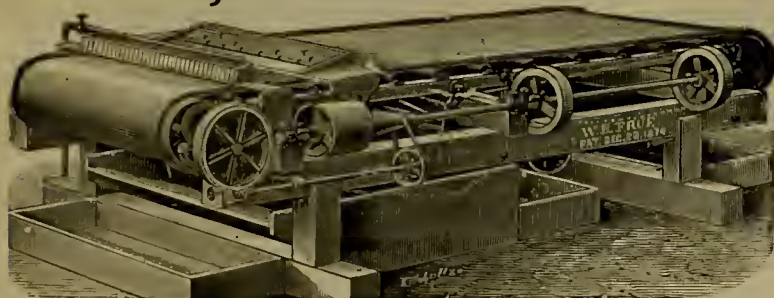
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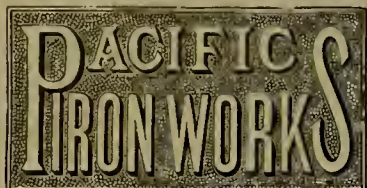
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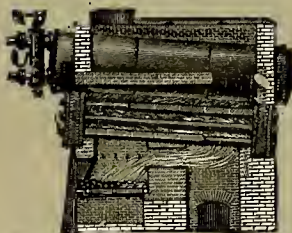
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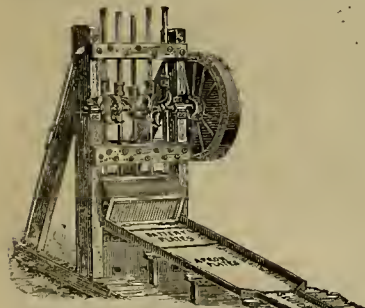
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